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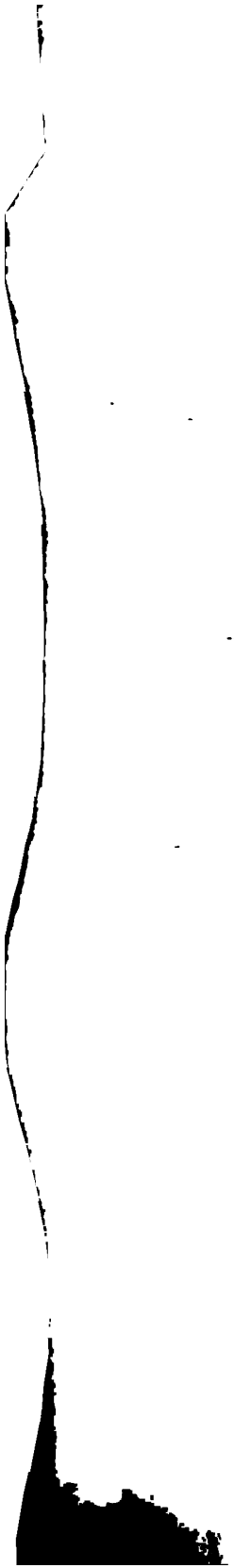

TRANSACTIONS

OF THE

AMERICAN

OPHTHALMOLOGICAL SOCIETY.

ELEVENTH ANNUAL MEETING.

NEWPORT, JULY, 1875.

NEW YORK:

WILLIAM WOOD & CO., 27 GREAT JONES STREET.

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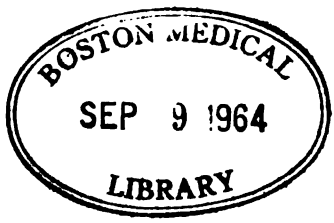

CONTENTS.

PAGE

Members of the Society..... 279
Minutes of the Eleventh Annual Meeting..... 281
A Case of Nystagmus, associated with Concomitant Convergent Strabismus, in Emmetropic Eyes, relieved by Correction of the Squint. By Dr. O. D. Pomeroy, New York..... 283
A Case of Spontaneous Cure of Subretinal Effusion, with Analysis of Twenty-one Cases of the same Disease. By Dr. D. Webster, New York..... 284
Rare Cases, with Practical Remarks. By Dr. E. Williams, Cincinnati, Ohio..... 291
Ophthalmic Contributions. By Dr. Geo. Strawbridge, Philadelphia, Penn..... 302
Successful Extraction of a Foreign Body from the Retina, by the aid of the Ophthalmoscope. By Dr. Geo. T. Stevens, Albany, N. Y..... 308
Can Staphyloma Posticum be induced by Astigmatism? By Dr. Wm. Thomson, Philadelphia, Penn..... 310
On the Increase of Refractive Power of a Plano-Cylindrical Lens, when rotated about its Axis. By Dr. G. Hay, Boston..... 319
Some Peculiar Phenomena attending a Case of Sudden Temporary Loss of Hearing and Sight. By Dr. H. W. Williams, Boston..... 325
Two Cases of Vascular Disease of the Orbit. By Dr. Geo. C. Harlan, Philadelphia..... 327
Case of Sector-like Defect of the Field of Vision. By Dr. Wm. Thomson, Philadelphia..... 337
On the Effect of a Cylindrical Lens, with Vertical Axis placed before One Eye. By Dr. O. F. Wadsworth, Boston..... 342
A Case of General Sarcoma of the Choroid, probably Congenital. By Drs. R. J. McKay and H. C. Eno, New York..... 345
A Case of Consecutive Enucleation of both Eyes for recurring Glioma. By Drs. C. R. Agnew and H. C. Eno, New York..... 349
Iridotomy by Von Wecker's method. By Dr. John Green, St. Louis..... 352
Notes on the Examination of the Eyes of a Criminal executed by Hanging. By Dr. John Green, St. Louis..... 354
Castor-Oil as a Menstruum for Dissolving Atropia for Application to the Eye. By Dr. John Green, St. Louis..... 355
Improvements in Spectacle Frames. By Dr. Henry D. Noyes, New York..... 356
Appendix..... 358

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OF THE

American Ophthalmological Society.

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Total..... 7

Whole Number.....73

AMERICAN OPHTHALMOLOGICAL SOCIETY.

NEWPORT, *July* 22, 1875.

THE Society held its Eleventh Annual Meeting at the Aquidneck House.

The following members were in attendance:

DR. C. R. AGNEW	New York, N. Y.
" ARTHUR MATHEWSON	Brooklyn, "
" LEWIS S. DIXON	Worcester, Mass.
" GEORGE T. STEVENS	Albany, N. Y.
" E. HUTCHINSON	Utica, "
" H. G. MILLER	Providence, R. I.
" J. J. B. VERMYNE	New Bedford, Mass.
" J. H. DIX	Boston, Mass.
" G. HAY	" "
" GEO. C. HARLAN	Philadelphia, Penn.
" C. J. KIPP	Newark, N. J.
" D. B. ST. JOHN ROOSA	New York, N. Y.
" HENRY W. WILLIAMS	Boston, Mass.
" WM. F. NORRIS	Philadelphia, Penn.
" E. WILLIAMS	Cincinnati, Ohio.
" JOHN GREEN	St. Louis, Mo.
" GEO. STRAWBRIDGE	Philadelphia, Penn.
" O. F. WADSWORTH	Boston, Mass.
" T. R. POOLEY	New York, N. Y.
" J. S. PROUT	Brooklyn, "
" OREN D. POMEROY	New York, "
" D. WEBSTER	" "
" A. G. SINCLAIR	Detroit, Mich.
" C. S. FENNER	Louisville, Ky.
" S. F. MCFARLAND	Oxford, N. Y.
" B. JOY JEFFRIES	Boston, Mass.
" C. S. MERRILL	Albany, N. Y.
" RICHARD H. DERBY	New York, "
" H. D. NOYES	" "
" H. ALTHOF	" "
" W. THOMSON	Philadelphia, Penn.

The first session opened at 9.45 A.M. The President, Dr. Agnew, in the chair. Dr. Webster was elected Secretary *pro tem.*, in the absence of Dr. Richard H. Derby. The Chair then appointed a committee, consisting of Drs. Wadsworth, Strawbridge, and Pooley, to prepare a bulletin of papers to be presented; also a committee on the election of new members, consisting of Drs. E. Williams, H. W. Williams, John Green, Roosa, and Norris.

The Report of the Treasurer was then read and referred to an Auditing Committee, consisting of Drs. Pomeroy and Kipp. This Committee reported the Treasurer's account correct, and it was accepted.

The Committee on Membership were by resolution charged with the duty of nominating officers for the ensuing year, and proposing the place of the next annual meeting. The President called the attention of the Society to the death of Dr. Edward Delafield, one of the founders of the New York Eye and Ear Infirmary. Drs. Dix and Williams, of Boston, were appointed by the Chair to prepare for the minutes a notice of Dr. Delafield.

The President appointed Drs. Kipp, Stevens, and Vermyne, a Committee to report a subject for discussion at the next annual meeting.

The Committee on Membership reported to the Society, and recommended for election

Drs. S. F. McFarland	Oxford, N. Y.
" Jno. D. Rushmore	Brooklyn, "
" C. S. Fenner	Louisville, Ky.
" Emil Gruening	New York, N. Y.
" David Coggin	Salem, Mass.
" Albert G. Heyl	Philadelphia, Penn.

All these gentlemen were duly balloted for and elected.

The Committee on Bulletin reported the following order of papers:

A CASE OF NYSTAGMUS ASSOCIATED WITH CONCOMITANT CONVERGENT STRABISMUS, IN EMMETROPIC EYES, RELIEVED BY CORRECTION OF THE SQUINT. By O. D. POMEROY, M.D., New York.

MARGARET DUGGAN, native of Ireland, aged 33. Since infancy she has had a convergent squint on exclusion by the screen, in the left eye of about four lines and in the right about three lines. She never fixes with the left eye of her own accord. The refraction is emmetropic in each eye.

The vision is $\frac{2}{10}$ in the right, and $\frac{1}{10}$ in the left, or most squinting eye. Signs of an old choroiditis will partially explain the diminution of vision.

Amblyopia from disuse of the left probably explains the poorer vision of this eye. The nystagmus had existed for about five years, and was very troublesome.

It was almost impossible to obtain even a cursory view of the fundus oculi, so constant and rapid were the oscillatory movements of the eyes.

On August 19th, 1873, the tendon of the internal rectus of the left was divided, with partial correction of the position of the eye, but without influence on the nystagmus. Four weeks subsequently, a tenotomy of the internal rectus of the right was done, causing, for the time, a fair correction of the strabismus.

The nystagmus, after a few days, had almost wholly disappeared. As the left eye very soon began again to converge, a second tenotomy of the tendon of the internal rectus was done four weeks subsequent to the last operation. A suture fastened to the conjunctiva, near the external margin of the cornea, and attached to the integument of the temple, sufficiently fixed the eye in a divergent position. The last operation completely corrected the squint, and after a few weeks the nystagmus had completely disappeared. At present (Sept., 1875) the position of the eyes remains correct, and ordinarily there are no signs of nystagmus. If the eyes are turned very strongly to the left, a slight oscillation of the eyes is detected, which immediately disappears on placing the eyes in a more natural position.

As the result of the operation remains unimpaired after two years, it seems fair to suppose that no relapse will occur.

A CASE OF SPONTANEOUS CURE OF SUBRETINAL EFFUSION, WITH AN ANALYSIS OF TWENTY-ONE CASES OF THE SAME DISEASE. By DAVID WEBSTER, M.D., of New York.

MISS M. G., 57, was first seen by me on June 26, 1875. She informed me that both her eyes had been excessively near-sighted from infancy, the right so near-sighted as to have been of little use. She had never worn glasses, because concave lenses sufficiently strong to improve her sight diminished objects to an intolerable degree. Her eyes had never given her any trouble worth noticing, however, until the summer of 1874. She had then been prostrated and confined to her bed for three or four days by "a rush of blood to the head." In the course of this attack her vision became somewhat impaired, and remained in this condition until about two months before I saw her, when it became suddenly much worse. For the last two months she has had appearances like wreaths of smoke passing before her eyes, with occasional flashes of light, the latter being observed only while in the dark. She sees only the lower halves of objects with the right eye.

She has been subject to occasional attacks of facial erysipelas from childhood.

O. D., V. $= \frac{1}{200}$ in lower portion of visual field; no improvement with glasses.

O. S., V. $= \frac{6}{200}$ without glasses; with $- \frac{1}{36}$ V. $= \frac{20}{200}$. Ophthalmoscopic examination with dilated pupils shows a prominent detachment of the lower half of the right retina.

In the left eye are seen large floating bodies, with diffused opacity of the vitreous.

Dr. Agnew saw the patient three days later, and, after a careful ophthalmoscopic examination, confirmed the diagnosis.

She was advised to go to bed, and lie on her back for ten days, having a four-grain solution of sulphate of atropia dropped into both eyes three times a day, and then to come to see us again. She returned on July 19th, stating that she had strictly followed our instructions.

Upon examination we found that there was no longer any separa-

tion of the retina to be seen. The floating bodies in the left vitreous were less, and the diffused opacity had so cleared up that the bottom of the eye could be satisfactorily examined. In both eyes there was extensive staphyloma posticum, with large plaques of choroidal atrophy and exudation. O. D., V. = $\frac{20}{100}$ with $-\frac{1}{14}$. O. S., V. = $\frac{20}{70}$ with $-\frac{1}{2}$.

During the treatment of this patient by the supine position, the light was not excluded from the room, and she was allowed to partake of her usual food in moderate quantities. She was not permitted to quit the recumbent position for a moment for any purpose. Her general health did not suffer from the confinement, though she complained of feeling "a little weak" when she first rose from her bed.

The following is an abstract of twenty-one cases of detachment of the retina, taken from the case-books of Dr. C. R. Agnew, of New York:

Sex.

Thirteen males.
Eight females.

Age.

Two between the ages of 16 and 20.
Two " " 20 " 30.
Four " " 30 " 40.
Six " " 40 " 50.
Two " " 50 " 60.
Three over 60 years of age.
Two age not noted.

Eye Affected.

In eight cases, right eye.
In ten " left "
In three " both eyes.

Refraction.

One was emmetropic.
Two were hypermetropic.
Nine were myopic.
Four were of traumatic origin.
Five refraction not noted.

Location and Extent of Detachment.

In seven cases the detachment was of the upper portion of the retina.

In three cases the detachment was of the lower portion.

In five cases the detachment was total.

In three cases the detachment was nearly total.

In one case one eye total, the other in the upper half.

In one case the detachment was nearly total in both.

In one case the detachment was total in both.

Causation.

Four cases were of traumatic origin; one was injured with a knitting-needle, one by a pair of scissors, one by a spent bullet, and one by a gunshot wound.

Nine cases seemed to be the result of myopia, with its attendant diseases. In two of these cases there was sclerochoroiditis posterior, with floating bodies in the vitreous of the fellow-eye; in two, floating bodies in vitreous of fellow-eye; in three, staphyloma posticum of fellow-eye; in one, cataract of fellow-eye; in one case, in which there was detachment of both retinæ—one three years later than the other—there were old opacities of both corneæ; in one the detachment occurred in one eye two years after it occurred in the other.

Two cases were hypermetropic. The notes of these cases are as follows: Mrs. A. H. B., 42, fourteen years ago had severe neuralgia of head, face, and eyes. Eyesight began to fail two and a half years ago. First symptom, diplopia.

O. D., V. $= \frac{5}{200}$ without glass; with, $+ \frac{1}{15}$ V. $= \frac{20}{60}$. O. S. detachment of retina nearly total.

D. B. W., 23, medical student; one year ago, while reading in the morning, both eyes became suddenly and totally blind for a few moments. Was perfectly conscious at the time, and had no pain, vertigo, or other disagreeable feeling. The sight returned at once to O. D., which has not troubled him since, except by a couple of black spots which lately appeared. The sight partially returned to O. S., but it gradually became worse until he lost all perception of light.

O. D., V. $= \frac{20}{20}$; Hm. $\frac{1}{48}$. O. S. total detachment of retina.

One was noted as emmetropic, with vision $\frac{20}{20}$ in fellow-eye. The following is her history: Miss M. B., 34, four months ago discovered

suddenly that her left eye was nearly blind. Never had any trouble with either eye before. Has long been subject to headaches, which settle in the back of her head, and are very intense. These attacks are brought on by any undue excitement. Has always been in the habit of taxing eyes severely in doing embroidery and other fine work.

Five cases are without notes of refraction. The following short sketches of their histories may be of interest:

J. B., starch manufacturer, O. S. vision lost one and a half years ago by iridochoroiditis; T— ; lens opaque; total synech. post. with bulging of iris; no perception of light. O. D. was good up to last Friday morning, when, while brooming out grain in a canal boat, in the early morning, the vision of that eye grew bad so rapidly that when he came out of the boat he could scarcely make his way about.

Eliza M., 36, ten years ago O. D. became blind gradually; no perception of light; pupil elongated vertically; lower half of iris bulged forwards by opaque white mass pressing against it from behind. O. S. saw well up to three months ago, when it became almost blind in the course of a day. The detachmment is almost total.

J. H., 66, merchant, twenty months ago O. D. became suddenly blind, and seven months ago O. S. became blind in the same way. Cannot count fingers, but can tell the time of day on his own watch with the sun shining directly upon it. Can make his way about the streets on a bright morning. Detachment of the retina, with floating bodies and incipient cataract, both eyes.

Bridget R., 50, detachment of the upper part, O. S. came on in the night and was first observed in the morning.

M. M. J., upholsterer, four weeks ago noticed a blur in lower part of right eye. When he awoke the next morning the obscuration of vision was much increased. Detachment of the upper third.

In all of these cases an unfavorable prognosis was given, and very few of them were seen a second time. Two were treated unsuccessfully by the recumbent posture. One man, a farmer, in whose eye the detachment had existed for six months, kept his bed for six weeks without improvement; another, a student, lay on his back four weeks and rose with vision unimproved.

DR. WADSWORTH.—*Mr. Chairman:* I also have seen a partially separated retina become replaced, but without treatment by the recumbent position. The patient was a lady of 36 years, a teacher, unmarried. In April, 1874, she came to me with a

central retinitis and central scotoma in the right eye. She was very nervous, depressed, complained of wakefulness, and indefinite unpleasant feelings along the spine, etc., but was in fair flesh and strength. Under rest of the eyes and tonic treatment the retinitis and scotoma disappeared, and the nervous symptoms became less. In the middle of June V. in the right eye was $\frac{15}{20}$. During the following summer she was in the country, and had no trouble with her eyes, but in September she went to a water cure in Western New York, by advice of friends, on account of "distress" in her head. There she remained some two months, fasted and was packed, and was directed to sit quietly after meals, as long as possible with the head bowed forward on the breast. She did sit in this position some two hours daily. She returned home on discovering that vision of the right eye was again failing. A week later I saw her. There was again a central scotoma, and a separation of the retina, of small extent, just below the region of the macula. While the retina, just outside the disk, was seen clearly with -16 (upright image), the summit of the separated portion was seen clearly with $+24$. Her condition precluded entire rest; she "was so nervous that at times she felt as if she would go crazy." Moderate exercise in the open air, avoidance of stooping or inclination of head, attention to diet, etc., and, of course, non-use of eyes were advised. A week later the separated retina had gone back into place, and was now seen with the same glass as the retina to the outer side of the disk, *i.e.*: -16. During the next month the retina remained in position, and V. gradually improved to $\frac{15}{64}$. I have not since seen her.

NOTE.—November, 1875.—I have recently learned that the patient went back to her school in February, 1875; did well for a while, and then broke down from nervous depression, but without complaint of her eyes. She is now at an establishment for the treatment of nervous diseases, and the physician in charge writes me that she can read the heading of "*The Nation*" at 18′, and has no difficulty in reading fine print with the right eye.

DR. E. WILLIAMS.—I have operated but once in a case of detachment of the retina, and the result was not at all encouraging. I do not believe that long confinement in a dark room on the back, or any other treatment for this unfortunate condition, does much, if any, permanent good. I was anticipated in

the operation in one case. A farmer from the country called with a large recent detachment above. I proposed an operation, which he decided to have done after a few days. Before returning, however, he was struck on the eye by an ear of corn, and soon after there was a perceptible change in his sight for the better. When he came again, I found that the retinal bag had been ruptured, and the detached portion appeared to be returned to its connection with the choroid. The vision in the lower part of the field had improved.

Dr Strawbridge.—I have recently seen a case of retinal separation. The patient was a girl of sixteen. The left eye, which was highly myopic, had been blind for a year from total separation of the retina.

The retina of the right eye, ten days before my examination, had commenced to separate in the upper temporal quarter, as could most distinctly be seen with the ophthalmoscope. There was entire failure of the corresponding portion of the visual field. With this eye she could read Jäger No. 11 with great difficulty. I made the Bowman operation for her relief. With two needles, introduced through the sclera, in its upper temporal quarter, a free incision or tear was made in the retina. This was followed immediately by a large subconjunctival chemosis. The next day showed the retina entirely replaced, and visual field perfect. Vision was greatly improved. At the present time, five weeks after the operation, patient can read Jäger No. 2, and there is no return of the trouble.

Dr. Mathewson.—I have lately seen a case of separation of the retina, resulting in recovery. Mrs. W., æt. 50, was brought to me by her family physician, on account of defective vision of the left eye, on September 14th, 1874. August 7th, she had experienced unpleasant feelings about the head and eyes, as of approaching sick headache, and a short time after discovered that the sight of the left eye was affected. The ophthalmoscope showed a detachment of the lower and outer parts of the retina, so prominent and well marked as to admit of no doubt in the diagnosis. There was a corresponding limitation in the field of vision, which was everywhere very indistinct. The eye was emmetropic. An unfavorable prognosis was given. The patient was not seen again until May 14th, 1875, though I

had learned through her physician that her sight had greatly improved. It was found on examination at the above date to be $\frac{20}{L}$, and with $+ \frac{1}{36}$ she could read No. 4 of Jäger with ease. The retina had regained its normal appearance. There was no visible indication of any rupture. The history of the case, from the time I had first seen it, was that vision had gradually grown worse, and the field more limited, till she could only see the floor and objects a foot or so above it. This condition continued for two or three months, when she began to use dry cups to the temples, very frequently allowing them to remain on for hours, as they seemed to relieve an unpleasant feeling about the eye. Wet cups were also applied twice a week. These means were employed persistently for months. After a time her vision began to improve, and has continued to do so.

She was last seen by me July 19th, when her vision was slightly better than at the last previous examination. The field of vision was still somewhat limited at the upper nasal side. The patient had not at any time strictly maintained a reclining position.

Dr. Kipp.—In regard to the treatment of retinal detachment by the recumbent posture, my experience has led me to believe that it is not devoid of danger to the patient's general health. Some years ago I tried this treatment in the case of a robust-looking man, of active habits, about fifty years of age, whom I saw a few days after the impairment of vision had been first noticed. The retina was detached in the lower half in both eyes. There were no signs of an inflammatory affection in either eye. There was no myopia. The closest examination failed to discover disease of the kidneys or liver. The patient was kept on his back in a moderately dark room for about three weeks. Atropine was used for the purpose of paralyzing his accommodation. A few leeches were applied to his temples on the second day of the treatment, and fifteen grains of the iodide of potassium were administered daily. This treatment was not attended by the slightest improvement in his eyes, but broke down his general health to such a degree that for several months subsequently he was hardly able to move about, and he has been in feeble health ever since, his family firmly believing that it is due to this treatment.

RARE CASES, WITH PRACTICAL REMARKS. By E. Williams, M.D.

Mrs. A. L., a Frenchwoman, æt. 35, mother of three children, all with good eyes, was examined March 26, 1875. Of seven brothers and sisters, two have peculiar eyes, one of whom I saw with her, and will give his case below. Till three weeks ago she had always read and sewed with the right eye without glasses. The left had always been very imperfect. Three weeks ago the good eye was injured by a blow from the hand of her child. Sight was immediately and seriously impaired, and so remains.

Status præsens: R. e. iris darker colored, with traces of blood in bottom of anterior chamber, and trembles freely on the slightest motion. Pupil medium in size, and slightly movable. V. = fingers at three feet; lens clear, but slightly luxated downward and outward, which could only be detected positively by dilatation of the pupil. Moderate ciliary injection and slight photophobia, with weeping, and tenderness to the touch.

L. e. lens luxated downward, shrunk, and quite white. V. = fingers at one foot, and slightly improved by + 2½ glass. Pupil in both eyes but very slightly eccentric upwards. Ordered atropine and perfect rest. Have heard since that the eye is better, but nothing further. It is probable that the lens in r. e. was dislocated by the blow, as up to that time she had always read with it without glasses. It may have been out of place before, or if it was not, there was a predisposition to displacement, as indicated by the condition of the other eye and the family history.

The brother, L. B., who accompanied her, aged 30, presented the following curious conditions: As I published a detailed description of this case some three years ago, I will only state his present condition, and the changes that have occurred since his visit at that time. He is a well-developed, stout laborer. The eyes are of a very light gray color, and present the peculiar appearance which light-colored eyes show when under the influence of the calabar bean. The pupils are very small, oval, and very eccentric upward and outward, being partly covered by the upper lids. But a few fibres of iris intervene between the pupil and periphery of the iris. The long diameter of

the oval pupils is in the direction of the eccentricity. They respond promptly to light, and when contracted are almost invisible at the free margins of the upper lids. Under atropine they dilate to about twice their usual size, and become more circular.

The trembling of the irides is so striking as to be noticeable at several feet, and the chamber very deep.

R. e. Lens not visible except under atropine, and so far as can be seen, clear. Its upper edge presents in the lower part of the pupil occupying less than one-fourth of its area. Vitreous and fundus clear, and no alteration, except a slight staphyloma posticum. V. = Snellen $2\frac{1}{2}$ with $+ 2\frac{1}{2}$. In this eye, when I saw him three years before, the lens occupied two-thirds of the pupil, and he had troublesome diplopia monocularis, which induced him to come for consultation. Without a glass he fixed his attention on the image through the lens, but with it, the other was sharp and clear. In the left eye, at that period, the lens presented about as much in the lower edge of the pupil as that of the right does at this time. Now it is invisible, being entirely out of the pupil, and only slightly seen by looking downward and backward behind the iris, and appears clear. Vision in this eye much improved by convex 4 for distance, and $2\frac{1}{2}$ for reading. He sees to work perfectly well, however, in ditching, etc., without any glasses. I scarcely need say there was no coloboma of the ciliary body or choroid.

The two following cases of spontaneous luxation of the lenses, also in brother and sister, present some points worth reporting. Mary J., æt. 28, single, consulted me July 17, 1875. Eyes slightly divergent, pupils small and sluggish, irides trembling, and of a bleached, dirty gray color; chambers deep. Her eyes have been about equal till within the past few weeks, when she noticed a glimmering before the right, and a curtain dropped down from above, nearly cutting off all vision. All qualitative perception is abolished in the field of vision, except below where she counts fingers near the floor at three feet. Eye slightly injected, and sensitive to light and touch; tension 1, and she complains of the constant glimmering before that eye.

Pupil small, central and round, but does not dilate much with atropine. The lens, semi-transparent, is dislocated *upwards*, leaving about one-fourth of the pupillary area clear. The lower edge tilts backwards in vitreous, while the upper seems to rest against iris and push it slightly forward. With ophthalmoscope, red reflex above, but bluish-gray appearance below, indicating detachment of the retina; fundus invisible.

L. e. luxation *upwards*, and two-thirds of pupil free. Lens transparent, but appears small, the lower edge also presenting backward, and the upper pushing iris slightly forward. No double vision. V. = $\frac{15}{200}$, and with + 7 = $\frac{15}{40}$. She reads Snellen 1 with + 4½ at six inches. Could see fundus dimly; but as I did not wish to put anything in this eye atropine was not used. The father's eyes were like theirs, but their mother and only brother had good eyes. In her right eye the irritation and detachment of the retina came on without trauma, confirming the well-known fact that all such eyes are liable to blindness from disease of fundus, and especially from detachment of the retina. The patient says she has always been a great reader by the aid of glasses, which she did not have with her. Her brother, Marcus J., æt. 26, large and *loose-jointed* like his sister, brought her to see me, but had NOTHING the matter with his eyes, always having seen PERFECTLY, as he declared. A marked divergence of his eyes and their peculiar expression attracted my attention, and I noticed that he stuttered. On inspection I found the same deep chambers, trembling irides, pupils small and central, but pear-shaped; the points presenting downward, and sluggish. L. e. V. = $\frac{15}{100}$, and improved to $\frac{15}{20}$ + with + 7. R. e. V. = $\frac{15}{200}$ and $\frac{15}{50}$, with + 7. Divergence 3 lines, the patient fixing usually with the left eye, with which he reads Snellen 1 with + 4½. Both lenses are displaced upward, the right slightly inward. When eyes are horizontal the lower edge of each lens comes below the centre of the pupil, but he has no diplopia. Lenses a little hazy and reduced in size. Field of vision perfect in both eyes.

BASEDOW'S DISEASE.

Without discussing the causal connections and origin of the three peculiar symptoms of this disease, and without tedious details of cases, I refer only to two for their practical importance. One was a woman of 35; widow; small, delicate, and of a highly nervous temperament, with extreme exophthalmus, goitre of medium size, and pulse habitually from 120 to 140. The attack followed the distressing illness and painful death of her husband some years before. She was the mother of a healthy girl of ten years. When I saw her she was very much emaciated, and presented in all respects a most pitiable condition. But most of all, she was mortified by the frightful appearance of the eyes, for which she alone asked or expected relief. I made Graefe's operation of closing the lids for half an inch at the

outer commissure in each eye, without ether. She bore it well, and I closed both eyes with a wet compress and bandage.

Next day the lids were united and doing well. The following day the right eye began to show chemosis and haziness of the cornea, before perfectly clear. I strapped the lids together, and kept the cornea covered as well as possible for two days. But the destructive infiltration of the cornea, commencing in the centre, went on from bad to worse till the whole cornea sloughed in the course of a week. On the third day I removed the stitches from both eyes, and the lids remained adherent. Two days after this destructive inflammation set in, the left eye began and went the same way, although I completely closed the lids after the second day with sutures passed through folds of the skin in the upper and lower lid, and tied across the margin. As the eyes continued to pain her severely and to suppurate, her general condition, in spite of the most faithful nursing and treatment, grew worse and worse, and she died about four weeks after the operation. In this instance certainly the operation hastened the fatal termination.

I was overpersuaded by the patient, although the eyes were only slightly injected, sensitive to the light and watery, but the corneæ perfectly natural. For that reason there was no urgency, but the patient was willing to suffer and run the risk solely to be relieved of the staring deformity. In a similar case I should never operate again, unless trouble in the cornea had set in.

Another woman, 40 years of age, large and rosy, and of fine personal appearance, presented herself about the same time for treatment. She also was a widow, whose husband, after a protracted illness, died of fearful convulsions some years before. The disease developed suddenly at that time. She had a small goitre, pulse varying from 100 to 120, and the eyes very prominent. Still she could close the lids by an effort, and there was no inflammation of the conjunctiva or corneæ. She wished to be relieved of the deformity of the eyes. Although extremely nervous, and ready to fly to pieces under the least noise or sudden excitement, I decided to operate. The operation was performed without ether, and she bore it well. The lids united nicely, and her appearance was marvellously improved. But on the second day after the operation the eyes became injected, sensitive to light, with slight chemosis, and a large phlyctenular patch on the limbus conjunctivæ at the outer commissure in each eye, the right being worse. I immediately removed the stitches from both eyes, and detached the lids slightly in the right eye. Under the use of

frequent instillations of atropine, keeping the eyes closed with a wet bandage, and perfect rest for over a week, the threatening inflammation subsided, leaving only a very slight marginal haziness of the right cornea. On being discharged she was going to Boston, and I advised her to consult Dr. Clark, which she did, and was under his treatment for some months with decided improvement of her general condition. I saw her some months after her return from Boston. She was still better, eyes appeared very well, and the exophthalmus scarcely noticeable, but the pulse was still 120.

I believe that the pressure of the narrowed commissure in both these cases caused strangulation and the consequent inflammation. In the fatal case the nutritive powers were at a low ebb, and the slightly increased pressure strangulated the corneæ. In the other case the conjunctival and corneal trouble were concentrated at the outer margins corresponding to the rigid commissures. If I make this operation again I shall pare and close the lids in the centre as well, so as to be sure of keeping the eyes closed, distributing the pressure and guarding against danger to the cornea. After a few days, when the eye is accustomed to the new conditions, the central adhesion might be detached with safety. In extreme prominence of the eyes, the least swelling of the conjunctiva after the operation makes it impossible to close the lids and keep them closed perfectly under the bandage with strips of plaster or any other means than stitches. Little by little the cornea will press forward, separate the lids, and come in contact with the dressing.

ANÆSTHESIA RETINÆ.

Out of a number of cases of retinal anæsthesia, treated during the last year, I shall only report briefly a few, some for the prompt and satisfactory manner in which they yielded to treatment, and one for its obstinacy.

Case 1.—Miss S., æt. 24, a healthy and vigorous person, without any known cause, became suddenly blind May 8, 1874. After a few moments the sight returned, but only for objects directly in front. During the next two days these blind attacks returned several times, lasting a few seconds and then passing off, the oblique vision remaining, however, all the time imperfect, the fields being much contracted. The next day, on examination, we found V. = $\frac{2}{3}\frac{0}{0}$ in both eyes, but on fixing the letters a few moments they and the entire board disappear till she rests. Field of vision at 2 feet: R. e. contracted to $3\frac{1}{2}''$ in the vertical, and $3\frac{1}{4}$ in horizontal diameter, and l. e. $4\frac{1}{4}$ vert. and 5 horiz.

Pupils of medium size and active. No disturbance of menstruation or other cause to account for it. Treatment: Subcutaneous injection of strychnine $\frac{1}{40}$ of a grain. May 10. Both fields slightly enlarged, r. e. 5″ in both vert. and hor., and l. e. $5\frac{1}{2}$ hor. and $4\frac{1}{2}$ vert. Strych. gr. $\frac{1}{30}$. May 11. R. e. 7″ in both meridians, and l. e. 8″. The blind spells do not return. Strych. $\frac{1}{30}$. May 12. 9″ vert. and 10″ hor. l. e., and 8″ in both meridians r. e. Strych. $\frac{1}{30}$. Saw patient no more till the 19th. At that time r. e. vert. 14″ and hor. 15″, and l. e. hor. 16′ and vert. 15″; has had no more sudden blind spells since last visit. Strych. $\frac{1}{30}$. After this she recovered entirely in a few days, and on July 1 says she has remained perfectly cured. The fact of the sudden occurrence of the disease in a perfectly healthy person, without any known exciting cause, is a peculiar one.

Case 2.—Mrs. H., æt. 38, fine and large personal appearance, but of a very nervous temperament, was married young, and had been the mother of eleven children at the age of 28 years! Two years ago she lost a child from an overdose of morphia administered by her by mistake. This has preyed on her happiness ever since. For some years her husband has been a paralytic, and a constant trying charge to her. She is also subject to chronic dysentery, with acute attacks frequently of great severity. April 13, 1874. She complains of asthenopia. She can only use her eyes for close work a few minutes at a time, and always with pain. She has a M. apparently of $\frac{1}{12}$ and V. = 1. She was not then willing to submit to the test by atropine. Ordered tonics and rest of the eyes. May 23. Returns worse than before. Atrop. (gr. iv. to ʒ i.) two instillations. Find H. $\frac{1}{12}$. Ordered glasses for constant wearing. Two weeks later patient returned. Has been much reduced by dysentery, and complains of momentary attacks of total blindness, and cannot feel safe in walking alone, because she cannot see objects at the sides. She now has extreme photophobia. Ophthalmoscope shows no change. Fields both contracted to 8″ vert. and 6″ hor., and V. = 1.

Sent home to her physician to have hypodermic injections of strychnine. These could not be tolerated, for the nausea and headache which they produced. After this she made several visits at irregular intervals, the vision and fields remaining about the same. Then she ceased coming till March 31, 1875, nearly a year after the first visit. Then her right field was diminished to a circle of 2″ diameter at two feet distance. Reads No. 2 Sn., but only sees two letters at once. In the word *not*, only sees, the *no* at once. L. e. field normal, but V. = only $\frac{1}{30}$, and with + 42c. = $\frac{1}{40}$. Fundus of eyes

normal. Tried strych. injections, but she could not bear them as before. Gave quinia, iron, and other tonic treatment. June 5, 1875. Has intense photophobia, and fields extremely small; l. e. $1\frac{1}{2}''$ hor., and $\frac{1}{2}''$ vert. and r. e. 2″ hor. and $1\frac{1}{2}$ vert. (always at two feet). We again tried injections of strych. $\frac{1}{60}$ grain the first time, and $\frac{1}{30}$ every second day. The first two caused no nausea or vertigo. Since that time we have not seen or heard how the patient is. For some weeks before the last visit her fields remained very small, and she did not venture to leave the house alone. She suffers often with violent attacks of dysentery still, and her eyes are always worse at those times, and better when her health improves.

It has now been over fifteen months since we first examined her, and her condition is much worse than at that time. It shows how persistent the disease may prove under the continuance of the many and aggravated causes to which she is subject. The strychnine treatment could never be used with any regularity, or indeed any other, and it is very questionable whether, with the painful dysentery and other numerous sources of mental and physical depression under which she is called to struggle, she will ever recover.

Case 3.—J. L. W., æt. 10, a delicate, nervous boy, with the following history: On the morning of April 11th last, he awoke and found he could scarcely see to recognize persons. He suffered no pain in the eyes, and thought that the dimness would soon pass away. Went to school as usual, but could not see to study, and returned home. His vision has remained about the same to the date of his visit to us, April 22. He has been subject to headaches through the temples for a year or two. Though of slender figure and anæmic look, his general health has been good. He is bright and intelligent, and answers questions promptly and satisfactorily. No muscular or other disturbance like chorea. At present he can only count fingers with r. e. at six feet, and not certainly at any distance with the left. The field of vision is contracted in r. e. to 6″ vert. and 12″ hor., at twenty feet distance, and in l. e. 2″ vert. and 6″ hor. He cannot tell his father from any other man, except by his size. Pupils moderately dilated but active. Fundus of eyes sound. 11 A.M. injected $\frac{1}{60}$ grain strych., and saw the patient again at 4 P.M. At that time the field was *complete in both eyes.* 23d, 9 A.M., reads letters No. 70 at 4″. Second injection at 4 P.M., read No. 30 at 3″. 24th. Third injection morning, and examination at 3 P.M.; reads 20 at 3″. Reach of vision better; could see a man in the adjoining lot, at about 50 feet.

25th. Fourth injection $\frac{1}{40}$ grain; reads 12.

26th. Sixth injection; reads 8 slowly.

28th. Seventh injection $\frac{1}{30}$; reads 8 readily.

29th. Eighth injection; reads 6 slowly.

30th. Ninth injection; reads 5 slowly.

May 1. No injection; reads $1\frac{1}{2}$ Sn. at $3\frac{1}{2}$ inches. Sight about equal in both eyes. Went home, and was ordered $\frac{1}{30}$ grain strychnia once a day internally. May 24. Returned. V. = $\frac{15}{20}$ nearly in both eyes, and he could read 1 Sn. slowly. June 22. Vision improved to more than $\frac{15}{20}$, and reads 1 Sn. rapidly.

No news from him since. This case, though very severe, recovered rapidly, the remarkable influence of the first injection in completely restoring the field of vision being perhaps the most interesting observation.

BINOCULAR TEMPORAL HEMIOPIA.

Frank H., æt. 44, fireman, and a large, robust, healthy-looking man. He has had frequent attacks of vertigo for some years, and unsteadiness in his gait at times. Six years ago he had several epileptic attacks, but has been free from them for four years. Has not complained of much headache, but of severe pains in the back of the neck coming in paroxysms. Has nausea frequently, but no vomiting. Memory impaired at times. He was examined by us July 23, 1873. The autumn previous patient first noticed that his left eye was defective. On closing the other he could only see the half of objects directly before him. During the past spring the right eye was becoming similarly affected. On examination with the ophthalmoscope there are no marked changes in the fundus of the eyes—no symptoms of atrophy—disks clear and sharp, of natural color. The veins alone appear a little tortuous. Tested with the candle there was a total loss of perception in the outer half of each field of vision, divided by a vertical line nearly through point of fixation.

Evidently the inner half of each retina was insensible. The patient returned a few times in the next two weeks, with the same symptoms. But as we could not promise him a certain cure he disappeared, and I have not been able to get track of him since, much as I longed to see his brain. He lived in a neighboring village, and has probably died. In this instance the lesion must have existed at the anterior part of the optic chiasm, between the roots of the optic nerves.

STRABISMUS WITH RIGIDITY OF THE MUSCLE.

Four cases of this kind have come into my hands, three of them within the past year.

Case 1.—A child, 21 months old, was brought to me in Sept., 1872, for *extreme* convergence of the eyes. In fixing objects the child was obliged to turn the head to one side and look across the nose, fixing with the opposite eye. The motion outwards was very limited, but difficult to establish in a patient so young and intractable. Each eye seemed to be constantly drawn toward the nose, and almost fixed. Under ether I made a double tenotomy, but with unusual difficulty. On seizing the eye to draw it outwards it could not be brought to the median line, and came suddenly to a stop, as though checked by a rigid cord. I found great difficulty in getting the hook under the entire tendon, and had to detach it with repeated and careful cuts with the points of the scissors.

The contraction and rigidity were about equal in both eyes. The mother stated that it was *born* with a marked convergence of the eyes, which had gradually increased till the date of the visit. There was no evidence of cerebral disease having existed in utero, and the child was in all respects healthy.

The immediate effect of the operations was very satisfactory. The eyes seemed to stand naturally for objects directly in front, but there was no *motion* either inwards or outwards, the child supplementing the absence of rotation by movements of the head, as indeed before the operation. The cosmetic effect, however, was excellent. The case did well, and the following statement of the mother, in a letter dated July 12th, 1875, will explain its present condition: "We think our little girl's eyes are now very nearly, if not quite right. They are almost perfectly straight, and she sees well out of both. When not well or sick, she does not seem to have so good control over them, the right eye at such times turns up in her head a little. We think, however, she never turns them in, and although her eyes appear perfectly natural and not at all fixed, yet she almost always turns her *head* from side to side, and *not the eyes*, in looking about her. By fixing her head, I can make her turn the eyes to either side, but they seem limited in both directions; not so much, however, as when you last saw her, about three months after the operation."

Case 2.—F. A., æt. 6 years, has convergent strabismus of about 3½ lines, the motion outwards being very much limited. It was impossible to test the vision accurately, as the child had not learned to read. There was evident amblyopia and want of mental development.

My partner, Dr. S. C. Ayres, made the tenotomy on both eyes, but with much trouble on account of the unyielding state of the con-

tracted muscles. By engaging the end of the hook under the edge of the tendon, and snipping little by little, pushing the hook further each time, he succeeded. Immediate result very good, but we could not test the movements, and have not heard from the case since the following day. On the same day we tenotomized the internal recti of his little sister, where the muscles presented the normal elasticity.

Case 3.—A young lady of 17 years had a convergence of the left eye *since birth*, as her mother distinctly remembers. The degree of deviation had increased till I saw her two months ago. The cornea, when she fixed with the other eye, was half hid behind the caruncle. She could not rotate it outwards quite to the centre of the commissure, and the eye was very amblyopic, she being only able to count fingers at three feet.

The other eye was perfect in all its movements, emmetropic, and vision 1. No appreciable change in the fundus of the eye, but it was difficult to examine on account of the great convergence. I operated without ether. On attempting to draw the eye outward it came to a sudden solid stop near the median line, and I felt at once that I had a rigid muscle. With hard work I got the hook under the tendon and tried to cut it off between the hook and sclerotic as usual. The tenotomy was exceedingly difficult, and when the tendon yielded suddenly to the last snip of the scissors, I saw a clear drop of vitreous at the bottom of the incision. The eyes were closed immediately with compress and bandage, and the patient put quietly in bed. For four days I kept her on her back, with the eyes closed and the compresses constantly wet with cold water. At the end of forty-eight hours I opened and examined the operated eye; I found it straight, but fixed, and looking very well. She recovered without the slightest pain or trouble, and is exceedingly well pleased with the improvement of her appearance. The pupil, slightly drawn towards the sclerotic wound at first, is now central, circular, and active as before. She says her sight is even better than before the operation. The eye is now but very slightly convergent when the other is directed in front, with no motion outward or directly inward. On trying to turn the eye inward the cornea turns upward and inward a little, but at the same moment the ball is retracted fully two lines into the orbit, and in that position the lids nearly close! In all other positions it is well open, but appears a little smaller than the other, as it was before the tenotomy. By looking with the ophthalmoscope inward and far forward, I could see a patch of choroidal atrophy, with the retina over it of a bluish-gray color.

These were undoubtedly changes produced by the perforation of the sclerotic, but I was most happy to see no more serious damage to the eye. I do not detect any detachment of the retina, and it remains to be seen if any further change ever occurs. In view of the extreme difficulty in severing the tendon in *such cases*, I shall in future make the incision of the conjunctiva directly over the tendon, and either use forceps to seize and raise the tendon, or cut it off externally to the hook.

Since writing the above I have had another case, in a boy five years old. Both of his eyes were rigidly, immovably drawn far inwards, and he rotates his head instead of the eyes. I operated on one eye, cutting the tendon externally to the hook, after making a free conjunctival incision directly over it. The eye now stands straight forward, but immovable, and the other converges as it has since birth. I shall operate on the second eye in a few days, and probably in the same manner.

OPHTHALMIC CONTRIBUTIONS. By Dr. GEO. STRAWBRIDGE, of Philadelphia.

I. HYSTERICAL BLEPHAROSPASM, TREATED AND RELIEVED BY FORCIBLE ELEVATION OF THE EYELID.

THE patient, a young lady æt. 22, of delicate health, and troubled with some menstrual irregularity, one year ago suffered from a sudden loss of voice, which was treated as a hysterical condition, with marked improvement. Six months after this occurrence, on awakening one morning she found it impossible to raise the eyelids, and at the same time considerable photophobia and lachrymation existed.

This condition lasted some days, and she then found it possible to slightly raise the left eyelid (no doubt owing to the great inconvenience of being entirely deprived of sight). This slowly increased until perfect motion was again restored to the left lid; but the right lid remained tightly closed, and the greatest effort at elevation resulted in an irregular twitching, without the least tendency toward opening.

By exclusion I was entirely convinced that here was a case of pure hysterical spasm.

After exhausting different methods of treatment without success, I determined on forcible elevation of the eyelid, by the plan proposed by Dr. Mathewson in the last year's Report of this Society, namely, by means of a gum band fastened to the skin of the eyelid, and also to the forehead.

The great difficulty in securing firm attachment of the rubber to the skin induced me to substitute a band of adhesive plaster, one end of which was firmly attached to the skin of the lower lid, and by traction the lid gently raised and held in position by securing the upper end of plaster strip to the skin of the forehead. This did not entirely prevent the lids from closing, and the patient submitted to the appliance very cheerfully.

The band at first was reapplied every day, the lid spasm continually lessening under the treatment, as well as the photophobia and lachrymation. Afterward, several days elapsed between the renewals of the band.

The moral effect was quite as great as the physical one. On several occasions, when the band had become detached without the knowledge of the patient, the lid elevation still continued, although the moment the plaster was intentionally removed the spasm at once showed itself.

This treatment, continued over several weeks, entirely relieved this curious condition.

II. FOREIGN BODIES IN THE EYEBALL.

It is most interesting to observe the number of cases that present themselves with severe injuries of the eyeball caused by penetrating foreign bodies, and where often for years they have remained without causing much apparent injury.

Case 1.—*Represents a foreign body* (iron splinter) *remaining now for two years in the sclerotic coat of an eyeball* without causing any great degree of reaction. The right eye of a man, æt. 25, was struck by a steel splinter, penetrating through the sclerotic near the tendon of the internal rectus, and passing across the vitreous humor without injury to the lens, and lodging in the sclerotic slightly outward and downward from the papilla. The ophthalmoscope revealed the following changes:

Outward and downward from the papilla was seen a large circular space, entirely white, evidently the bare sclerotic, in the centre of which was noticed a *small black object* the size of the head of a large pin, probably the iron splinter, although no metallic lustre was evident; but the entire absence of choroidal pigment at this place made it most probable that the black object was the iron splinter.

Around this white space choroidal degeneration was noticed. The vitreous humor was fluid and full of floating opacities.

V. = $\frac{20}{50}$, and marked defect in the central visual field. No irritation existed in either eye, and the man was constantly employed in his occupation of machinist.

Case 2.—An eyeball injury caused by an iron splinter passing through cornea, iris, and lens, and lodging in the sclerotic a line outward from the papilla. The accident happened ten years previously, and was followed by a cataract formation and a severe attack of irido-choroiditis. After a duration of several months this subsided, and for three years the eyeball remained quiet; then a second similar attack occurred, lasting a short time, and followed by a four years' interval of rest. A third attack, of similar character, and a three years' interval of quiet, was succeeded by a chronic irido-cyclitis, which, on account of sympathetic irritation of the second eye, rendered its removal neces-

sary. The iron splinter was found firmly embedded in the sclerotic, one line outward from the papilla, and the interior of the eyeball filled with the products of the previous inflammatory attacks.

Case 3.—An iron splinter encysted in the conjunctiva and sclerotic for twenty-one years, without the least injurious effect.

In this case the splinter struck the eyeball at the insertion of the rectus internus tendon, and partially buried itself in the sclerotic. This happened twenty-one years previously, and was followed by a slight inflammation, which quickly subsided; since then absolutely no inconvenience had been experienced.

Status Præsens. V. = 1. Eyeball is in entirely good condition. The iron splinter can be plainly seen embedded partially in sclerotic and partially in the conjunctiva. It can be grasped with a forceps, and is very adherent; no irritation exists, and the man will not consent to its removal.

These three cases are noteworthy, on account of the long time the foreign body remained in the eyeball, with but comparatively little suffering to the patient.

Case 4 was a recent injury.

The iron splinter passed through the cornea and lodged in the iris.

Examination twenty-four hours afterward revealed a clear lens and vitreous humor, but irregularity in the shape of the iris at the place of lodgment of the splinter.

The iron splinter could be clearly seen. By making a small iridectomy at the point of iris irregularity I was lucky enough to also remove with the piece of iris the iron splinter. This was followed by complete recovery of the eye, save some slight photophobia.

The diagnosis of a foreign body in an eyeball must of course be rendered a difficult matter, from the great liability to be deceived by inflammatory changes occurring so soon after the injury. In the case of metallic substances perhaps the only reliable test is the metallic lustre of the body.

III. CONNECTIVE-TISSUE GROWTH IN VITREOUS HUMOR.

Louis F., æt. 42, saddler, of regular, temperate habits, and sound of body, without rheumatic or syphilitic taint.

The first sign of the disease was noticed three years ago, resembling to the patient the descent of a dark curtain from above, but only on the right eye. This soon passed away, and the sight returned to the former condition. In the following year similar symptoms presented them-

CONNECTIVE TISSUE GROWTH IN VITREOUS HUMOUR.

selves, and in both eyes, followed in a few days by a marked improvement, but not entire disappearance, as in the previous year. This unfortunately did not prove permanent, and for the last two years there had been gradual failure of sight in both eyes, with constantly recurring phosphenes. There has been no pain or marked photophobia.

Right eye Em. V. = counts fingers at 4'; visual field very defective inward and upward.

Left eye Em. V. = counts fingers at 10'; visual field particularly defective, outward also upward. The *Plate* (*vide* Fig.) represents the ophthalmoscopic appearance of the left eye-ground. The great cloudiness of vitreous humor of right eye prevented sketching its ground.

Description of Plate.

The growth, starting at the optic disk, which it surrounds, is projected upward, also downward, also inward.

The upper division starts from the papilla by three roots, which quickly unite into one stem, and run upward and outward, terminating in two branches, which fade away in the vitreous humor.

Above and inward from the termination can be seen an oblong white patch, apparently insulated, with three radiations proceeding from it; also a number of new-vessel formations starting from it and ending in spiral curves. A narrow black border surrounds this patch.

The lower division of the growth spreads out, fan-shaped, downward and outward, running along the course of the descending blood-vessels, and becoming more and more delicate and feathery until it is finally lost in the vitreous humor. A small, elongated white patch is also found in the lower outer retinal quarter.

The inner division of the growth, commencing at the papilla, rapidly widens into a broad, wide-stretching membrane, traversed by numerous blood-vessels, and projecting well forward into the vitreous humor, so much so that by an oblique illumination it is plainly visible. This formation in some places appears thick, and of opaque white color, but in other places it is delicate and attenuated.

The optic papilla is entirely surrounded by it, and from the white patch in its centre is projected a new-vessel formation; also downward and inward a similar condition is seen.

Between the different portions of the growth, also in the periphery, the eye-ground is of normal color and appearance. Retinal veins tortuous and overfilled.

The growth appears to consist of connective tissue, in some portions much thicker than in others, when it becomes almost scarcely perceptible. This, with the curious spiral-curved vessel formations, makes up a most interesting ophthalmoscopic picture.

A growth in many respects similar to this is described by Jäger in his Ophthalmoscopic Atlas, page 144.

IV. CHOLESTERINE CRYSTALS FOUND IN THE ANTERIOR CHAMBER AND ON THE ANTERIOR SURFACE OF IRIS, AS WELL AS IN THE VITREOUS HUMOR, WITH A LARGE BONE FORMATION IN AN EYEBALL ATROPHIED BY TRAUMATIC IRIDO-CYCLITIS OF SIX YEARS' STANDING.

The patient, a boy æt. 16, was six years ago struck in the left eye by an iron splinter, causing a penetrating wound of cornea, iris, and lens, and followed by irido-cyclitis, which has been slowly going on since that time.

Status præsens: Eyeball much atrophied, tension greatly lessened, and pain is caused by pressure. A large opacity exists at point of injury in the lower half of the cornea, with strong adhesion of lower half of iris to cornea, and total occlusion of pupil. Upper half of anterior chamber is of moderate depth. Sprinkled over the anterior surface of the iris and through the aqueous humor were to be seen numerous small, sparkling, irregular-shaped, amber-colored crystals, having great refractive power, the effect being greatly increased by oblique illumination.

On account of sympathetic irritation existing in the second eye, the diseased eyeball was enucleated and carefully examined.

The cornea and sclerotic were found apparently normal, except at point of former corneal perforation. The anterior chamber was found to consist of a series of shallow pockets, formed by numerous adhesions between iris and cornea. These pockets were *filled* with *cholesterine crystals* and serous fluid.

The lens was shrunken to one-fourth its usual size, and closely adherent to the iris; the capsule was thickened and calcareous.

The interior of the lens was filled with cholesterine. In the vitreous humor two masses of true bone were found. The larger one—cup-shaped—spread itself around the optic nerve, and then extended towards the ciliary bodies. The second piece was ring-shaped, and situated directly under the ciliary bodies. The microscope showed the presence of lacunæ and canaliculi and other bone

deposits. Enclosed within the larger bone was found a clot of hæmatine, probably the remains of an old hemorrhage.

The space between the choroid and sclerotic was filled with cholesterine and granular pigment. With the use of polarized light the cholesterine crystals formed a beautiful microscopic object. The particular points of interest in this case may be briefly summarized as follows:

First, The immense amount of cholesterine that was found, not only in the vitreous humor, but also in the lens and the *anterior chamber, the latter being a rare seat of this deposit.*

Secondly, The large bone formation, the result of chronic choroiditis. The separate bone formation emanating from the ciliary bodies is also an interesting fact.

In looking over the literature of the reported cases where cholesterine crystals have been discovered, I find that their most frequent seat was in the vitreous humor, which was generally fluid; then in the cortical substance of the crystalline lens, also between the retina and choroid, also in the lachrymal sac.

A case reported by John Adam Schmidt (V. Ammon's Zeitschr. f. d. Ophthalmologie, Bd. I. S. 382) resembles in some respects the one reported in this article. In Schmidt's case the anterior surface of a calcareous degenerated lens was sprinkled over by a red, silver, and gold dust; also a deposit of this dust, to line depth, was found at the bottom of the anterior chamber, which, by motion of the eye, slowly swam through the anterior chamber.

In the great majority of cases these crystals are found in eyes diseased by choroidal inflammation.

SUCCESSFUL EXTRACTION OF A FOREIGN BODY FROM THE RETINA BY THE AID OF THE OPHTHALMOSCOPE. By Dr. Geo. T. Stevens, Albany, N. Y.

Mr. Matthias E. is a robust man, thirty-two years of age, employed in the office of the American Express Company. While engaged on the 6th of February, 1875, with another employé in the same office, in opening a packing-box, he holding the edge of a hatchet against the head of a nail while his companion struck the hatchet with a hammer, he felt a sudden shock, as though a piece of steel had struck the left eye. Temporary blindness succeeded the shock. In the course of half an hour, although the sight had returned, the eye was painful, having, as he expressed it, the sensation of a cinder beneath the lid. He at once consulted a surgeon, under whose charge he remained until February 22d, when the surgeon was kind enough to bring him to my office. At this examination I found the patient suffering considerable pain in the eye, to allay which he was taking morphine. The conjunctiva was injected. In the lower and outer part of the cornea, and about a line from the border, was a gray mark a line in length, and through the iris, at a point nearly corresponding to this mark in the cornea, but farther outward, was also a small opening. Examination with the ophthalmoscope showed a body having a dark gray metallic lustre, apparently lying partly on, and partly embedded in, the retina. Its position was behind the equator, and about equidistant from the horizontal and perpendicular meridians of the eye. Surrounding the foreign body was a ring of black pigment, and several patches of such pigment appeared in the vicinity. The eye was so irritable that no definite test of sight could be obtained.

The patient was at once informed of the gravity of the case, and the alternative of the loss of the eye for sight, with the probable necessity of its removal to save the other eye, or the extraction of the foreign substance was presented. He consented to the attempt for extraction, and on the following day, seventeen days after the injury, the extraction was effected in the following manner: A very careful examination with the ophthalmoscope having been made in order to determine the location of the foreign body, the patient, reclining on a couch, was brought under the influence of chloroform in a room which could be completely darkened by the closing of wooden shutters. Complete anæsthesia being produced, an incision was made

through the conjunctiva and the sub-conjunctival tissues from the border of the cornea backwards three-fourths of an inch, and between the inferior and external recti muscles, the tissues being turned away so as to expose the surface of the sclera. The shutters of the room being now closed, a "student's lamp" was held in position, and again the situation of the foreign body was exactly determined by the ophthalmoscope. At the same time a very delicate needle was carried through the sclera, the point of which, as it entered the eye, was seen by the ophthalmoscope to be exactly in contact with the anterior border of the foreign body. Daylight was now admitted, and an incision three lines in length was made through the sclera, the point of entrance of the needle marking the centre of the incision. The foreign body, which proved to be a fragment of steel, presented exactly in the middle of the wound, entangled in the retina. It was seized by a pair of fine forceps, and the small portion of the retina in which it was caught was snipped off with scissors. The distance from the centre of the pupil to the position of the foreign body was at once measured and found to be seven and a half lines. The wound was closed, and a suture brought the edges of the conjunctiva together. Cold-water applications were at once made and continued for several days. The case progressed without special incident until the eighth day, when he was well enough to be removed from the hospital to his home.

On the fifteenth day the eye was examined. There was loss of the inner part of the field of vision, but in the outer portion of the field sight was perfect.

On the seventeenth day he had a sudden sharp pain, and soon found that he could not see, except to count fingers. Ophthalmoscopic examination showed intra-ocular hemorrhage.

May 30. Eye looks perfectly well externally—no pain, but some intolerance of light—can distinguish bodies held on temporal side. The media are less opaque.

June 14. Sees more clearly. There is an appearance of dark shreds running across the vitreous; between these shreds the light penetrates. Disk cannot be seen.

June 28. Still improving. Media more clear, but disk not visible.

The Society adjourned.

July 22, 1875.

The Society met at 8 P.M. Dr. Agnew, the President, took the chair. The minutes of the morning meeting were read and approved.

CAN STAPHYLOMA POSTICUM BE INDUCED BY ASTIGMATISM? By Wm. Thomson, M.D., Phila.

Since the classic description of staphyloma by Donders, whose observations were made in cases of high myopia generally, and who regarded a staphyloma as one link in that unhappy chain of incidents beginning in fatigue and slight irritation of the conjunctiva, progressing to intra-ocular lesion, comprising floating bodies in the vitreous humor, circumscribed atrophies of the choroid, and terminating in blindness from cataract, hopeless changes at the fovea, or separation of the retina, the importance of the study of myopia has been acknowledged, and the most energetic efforts have been made to bring it under control.

Donders concluded that the crescents at the disk were induced, especially in those who have an hereditary predisposition, by prolonged convergence and accommodation in near work, which causes an inflammation of the choroid, and is attended by a stretching of the sclera, an elongation of the axis, and an increasing myopia. He remarked upon the difficulty of making observations by the erect method, and stated that in his studies the inverted method was used. His drawings show the variety of the directions of the crescentic atrophies; he has noted the straightened condition of the retinal vessels, and also the elongation of the disk at right angles to the direction of the atrophy, which he finds himself unable to account for. In low degrees of M. the crescents were narrow, but they were found larger in proportion to the higher degree of M. and the age of the patient. In two cases of H. crescents were found.

Jaeger believes that crescents are congenital, and that M. would be found in all classes, and not confined to those who use their eyes in prolonged near work. Mannhardt found M. frequent among the illiterate population of Italy. Cohn shows that its degree and its frequency increase as children are subjected to eye strain in early life, at school; and the belief that M. may be acquired and may become progressive, has led to the theory that prolonged convergence and accommodation will induce inflammation, softening, and stretching of the tunics of the ball, and that these results may be averted by the

long-continued use of atropine to overcome a supposed spasm of the ciliary muscle. This treatment has been employed by Dobrowolski, Derby, and others, whose reports are before the profession. Schnabel also reports that he has used this method, and that whilst the refraction was diminished by atropine, it was not more so than might be expected from its influence upon the accommodation in eyes of various refraction already observed by Donders. Spasm was observed in a few cases, but was neither frequent enough nor great enough to convince him that it could be an influential factor in producing high M. with great elongation of the axis. He describes two forms of staphyloma: 1. The congenital, found in eyes of all kinds of refraction, and analogous to coloboma of the choroid. 2. The acquired, due to staphyloma posticum and the displacement and atrophy of the choroid.

These conflicting theories render our views both as to hygiene and therapeutics painfully uncertain, and justify the presentation of any clinical facts that may aid us in the important duty of controlling myopia, in which these serious lesions are most frequently observed.

From my own observation I am led to believe that myopia, like hypermetropia, must be frequently congenital, and that we rarely find it without a complicating astigmatism.

When the M. is simple, the patients enjoy high V. with proper spherical glasses, suffer little or no asthenopia, and present eye-grounds free from crescents. I have before me the notes of such cases, from $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{4\frac{1}{2}}$, $\frac{1}{5}$, $\frac{1}{8}$, and upwards in degree, with perfectly normal eye-grounds. I have notes also of cases of hypermetropia from $\frac{1}{4\frac{1}{2}}$ upwards, with no lesions, high, if not full V., and absence of all fatigue when properly corrected. It is impossible to believe that a M. $\frac{1}{3}$ can have been acquired by inflammatory softening and elongation of the axis without exhibiting signs of it at the nerve entrance or elsewhere; nor can I believe that in M. of $\frac{1}{8}$, for example, there can be any injurious tension exerted upon the eye by the accommodation, since such myopes read without glasses at the *p. r.*, and have no need to use A.: furthermore, if prolonged A. could cause staphyloma posticum, we would inevitably find it in all cases of high H., where not only near, but even distant clear sight is only obtained by its vigorous use.

From the low V. obtained by spherical glasses in high M., and their failure to relieve asthenopia, I was led to seek for astigmatism, which I fancy must be frequently overlooked, from the tedious character of the examination needed for its detection, together with the

difficulty of the use of the erect method of the ophthalmoscope; and I am satisfied that a crescent at the optic nerve is an evidence of astigmatism, and that by a study of its situation one may form a close approximation to the best and worst meridians of the cornea. In the slight degrees of astigmatism the physiological cup and the small vessels may be displaced towards the margin of the disk, where a very narrow crescent, marked by the disappearance of the hexagonal cells only, may be observed. In high degrees the optic disk is changed into an ellipse in shape, the excavation into a slit, from which the large retinal vessels emerge as if from beneath an overhanging ledge, and proceed on their courses as though pulled straight, and without any of their normal freedom; at right angles to the long diameter of the disk will appear the brilliant white crescent, two or more times the size of the disk in extent, with its rounded arch directed upwards, downwards, or outwards, at any angle, but rarely reaching to the fovea, where, however, independent lesions are often found in old persons.

In the notes of one hundred cases of crescents, I find astigmatism combined with M. in eighty, and H. in twenty; and in all of these after their correction under atropia, with all the most trustworthy methods of examination, the line of the crescent has been found to correspond with the astigmatic meridian of the cornea, when viewed by the erect method through the correcting glasses. In a portion of the myopic cases the axis of the cylinder has been found to coincide with the long axis of the crescent, whilst in the remainder it coincided with the long axis of the disk, and was at right angles to the direction of the crescent. In the highest defects the crescents were double at either side of disk, or circular. In all the cases of astigmatism with hypermetropia, the axis of the cylinder coincided with the direction of the displaced choroid, and the crescents were as marked as in A. with myopia; in two cases needing + ⅛cy. ax. 90° there were crescents extending downwards more than twice the diameter of the disk. In these marked instances, particularly in M., the entire disk seems dragged towards the crescent, so that it is no longer possible to see into the depths of the porus opticus, which appears overhung by the edge of the excavation; and this sliding appears to account for the change in the shape of the disk from a circle into a narrow ellipse.

These persons all suffered from asthenopia, not relieved by any spherical correction, and many of them had used glasses of various powers for years. Regarding them as I did, I persevered through tedious hours of examination, until no better result or higher V.

could be obtained, and I have found the symptoms of irritation or inflammation removed by a proper sphero-cylindroid combination. Some of the cases have been under observation from two to five years, and have needed glasses remarkably high as $-\frac{1}{8}\bigcirc-\frac{1}{12}$ cy., or $-\frac{1}{8}\bigcirc-\frac{1}{6}$ cy., or $-\frac{1}{2}\bigcirc-\frac{1}{20}$ cy., or $-\frac{1}{12}\bigcirc-\frac{1}{12}$ cy., which the young persons use both for near and distant sight, wearing them constantly and with entire satisfaction.

In five persons the crescents were found in one eye only, the fundus of the other being entirely normal, and in these the eye with normal fundus was Em., or even highly myopic, while the one with crescents was found invariably astigmatic. How can we explain otherwise a case where the R. has M. simple of $\frac{1}{4}$, with a perfect disk, and the L. Am. corrected by $-\frac{1}{6}\bigcirc-\frac{1}{16}$ cy. ax. 40°, and a large crescent extending down and out at right angles to the direction of the axis of cylinder? Astigmatism, and not myopia, was coincident with the staphylomata in these instances.

The exceptional cases of astigmatism, where no crescents were found, were in persons who, for various reasons, did not enjoy binocular vision; some of these having convergent or divergent strabismus, with myopic, or hypermetropic refraction, or having either one eye amblyopic, or so different in refraction from the other as to render it probable that its vision was suppressed, and not subjected to the complicated strain inseparable from the use of relative accommodation.

These clinical facts would need illustrations to render them more striking, but the appearances of the disk suggest a dragged or displaced condition of its whole structure, and hint at a force which may act injuriously upon the choroid, and thus disturb unfavorably its nutrition, and cause inflammation and consequent atrophy.

These crescents must be regarded as either congenital or acquired. If the former, they should lose all their evil portent, and afford no ground of themselves for treatment; we must then be content with the observation that they correspond to congenital asymmetries of the cornea, and that the fact pointed out in these remarks has no value beyond facilitating the correction of astigmatism. If we fear, however, that they are acquired, may increase, and be attended by other well-known misfortunes, we will spare no efforts to gain a clearer insight into their natural history, by extended clinical studies, with a view to a rational method of treatment.

In searching for the causes of these lesions, so frequently seen in high M., we must abandon the idea that in myopia there is a severe

strain on the accommodation, since we know that it must be suppressed when myopes read, as they constantly do, with moderate degree of M. at their far points, uncorrected. When M. is ¼ or more we expect to find a divergent strabismus from deficient innervation of the interni by the third pair; we know that patients can read with one highly myopic eye without inconvenience, and that it is safe and practical for persons to do likewise in artificial M., as we see in watchmakers, engravers, and others who do near work habitually for years with the accommodation entirely at rest. All our practical views of refraction demand that an eye should be considered at rest when it is adjusted for its *p. r.*, which for E. is at infinity, for M. at some finite distance away; yet we clinically find choroidal changes in M., and their absence in H., and although the accommodation is at rest in the former, and strongly excited in the latter, we are told to ascribe the lesions to prolonged convergence and accommodation in myopes. The received idea of A. is that the ciliary muscle, under the influence of the oculo-motorius, in contraction, causes a relaxation of the zonula, and that the lens, by its own elasticity, becomes more convex and possesses a higher refraction. It would thus appear that in distant vision, when the eye is adjusted for the *p. r.*, there must be a state of muscular tension sufficient to restrain this elasticity of the lens, and that we must no longer regard this adjustment as equivalent to muscular repose. These anomalies lead to further inquiry into the function of accommodation, and encourage us to throw upon the subject the light of clinical observation, remembering that in this way Graefe eliminated the influence of the iris, at one time believed to be an essential factor in A., by exerting pressure on the periphery of the lens.

The authority of the great masters, Helmholtz and Donders, sustains the prevalent theory of A., although the former, in closing his remarks upon it, states that it has the character of probability, and is in all particulars the most reasonable, and thus permits the idea that it is not yet fixed as a scientific dogma.

In regard to the anatomy of the parts concerned, Prof. Iwanof states that the choroid is firmly attached to the sclerotic at two points: anteriorly at the transition of the sclerotic into the cornea by means of the annular tendon; posteriorly, at the entrance of the optic nerve, where its inner layers are continuous with a ring which embraces the nerve, from which fine fibres are given off which penetrate the nerve itself. The ciliary muscle, imbedded in the anterior part of the choroid, consists of smooth muscular fibres, arranged in a radiating manner, and the fasciculi of which can be traced backward into the

choroid; and of fibres in a circular direction, which form the inner portion of the muscle, and are known as the annular muscle of Müller. He states that the relative development of these longitudinal and circular fibres is subject to variation, and is dependent upon the length of the optic axis; that in hypermetropic eyes the annular portion is largely developed, whilst in the myopic ones the muscle consists chiefly of radiating fibres. These facts point to the independent use of these antagonistic fibres, and hint at the existence of a negative and positive power of adjustment, the influence of which in causing structural changes in myopia may be thus studied: Suppose a M. of $\frac{1}{8}$ in each eye; without glasses the person might be able to read at 8″ with binocular vision, upon condition that a proper convergence could be maintained without using any + A.; the effort to converge by aid of the third pair of nerves would bring out + A., would increase the refraction, and compel the person to bring the book nearer; any voluntary effort that could then be made would be towards diminishing the refraction whilst preserving the convergence, the clinical result of which we daily encounter in divergent strabismus: assume that the radiating fibres, having their attachments through the choroid to the cornea and optic nerve, resemble the string of a bow, and that the circular fibres can exert a power similar to that employed in discharging an arrow, and that, through their attachments by the zonula to the lens capsule, they can both exert an antagonistic power in relaxing or rendering tense the capsule: accept Iwanof's statement of the hypertrophy of the radiating fasciculi in M., and we can perceive how an injurious tension may be exerted upon the choroid, which, in prolonged near work, may impair its nutrition, and induce atrophy, or by pressure on the vitreous humor give rise to an elongation of the optic axis with progressive myopia. Helmholtz discussed a theory somewhat similar to this, proposed by Henke, but decided against it as unsupported then by sufficient evidence. Reasoning by analogy it would seem that the ciliary muscle, like the iris, should be provided with an independent action of its circular and radiating fibres, with a different nervous supply, and that we should not depend upon elasticity alone to enable our eyes to adjust themselves from the *p. p.* to the *p. r.*

In astigmatism I am satisfied that the eye endeavors to overcome its refractive defect by the power of A., and this can be proved by the clinical records of cases where asthenopia has rendered examinations necessary, in which V. $= \frac{20}{xx}$, but under atropine was reduced to $\frac{20}{L}$, where one meridian was E., and the other had H. $= \frac{1}{40}$, and where V.

was brought at once to $\frac{20}{xx}$ by + $\frac{1}{40}$ cy. Granting the effort an eye may make to neutralize its astigmatism, let us assume a case where each eye has an E. meridian and a *p. r.* at infinity for vertical lines, with M. $\frac{1}{12}$ for horizontal ones: place two cross lines thus arranged at 12″ from the eyes, and the horizontal one will be seen with suppressed A., but to see the vertical line at the same distance the A. must be used = $\frac{1}{12}$, and thereby the *p. r.* for the horizontal line would lie at 6″ away; combine these two eyes in binocular vision, and the law of *relative* A. would render all their muscular actions more intricate, and we would have emmetropic meridians increased by relative accommodation, and myopic ones of yet higher refraction engaged in the hopeless effort to transmit to the retina sharp images of objects which at 12″ would have their vertical and horizontal parts, for such eyes, in violent perspective; the former being seen with + A. = $\frac{1}{12}$, the latter by a vigorous effort at — A. To preserve binocular vision under these circumstances there might be, in reading, for example, a tension exerted upon the radiating fibres, which, according to Iwanof, would induce their hypertrophy and enable them to exert a strain upon the choroid which would be seen in the dragged appearances at the disk, and which might, by creating inflammation, give rise to choroiditis disseminata, etc.; finally, the line of such a displacement of the disk and choroid might well be supposed to have some connection with the unvarying astigmatic meridians of the cornea. The same reasoning will apply to hypermetropic astigmatism, since if the defective meridian is fully corrected by + A., the E meridian will need to have its refraction reduced by — A. The possibility that astigmatics, are under the necessity of making such endless fine adjustments in their near work, accounts for the severe asthenopia so often successfully removed by cylinder glasses.

Could it be shown that the radiating fibres of the ciliary muscle are, like those of the iris, under the control of the sympathetic system, the plausibility of these views would be largely increased, and the known influence of the third pair could be supposed to be confined to the circular fibres. Donders holds that atropine dilates the pupil partly by paralyzing the oculo-motorius, and partly by stimulating the sympathetic. It is known that in paralysis of the third pair the pupil, although partly dilated, becomes yet larger under atropine; we also know that while atropine dilates the pupil and paralyzes the A., its influence does not extend to the other fibres of the third pair, and ptosis and divergent squint are not observed even in poisonous doses; it would then seem that its influence upon the iris and refraction is most probably through

the sympathetic nerve. Were it possible to make accurate studies of the A. in animals the influence of the sympathetic might be set at rest, since upon its section we might expect to find, with myosis, an increase in the refraction; but we must depend as yet upon the rare cases of disease or injury of the sympathetic which present themselves clinically, and I have sought with care for this evidence in a few cases of pathological myosis dependent upon central nervous disease, but my cases were all in old men, and were complicated by atrophy of the optic nerve sufficient to render any observation as to the existence of a spasm of A. uncertain. One such case, however, has been recently reported by Dr. Reuling, of Baltimore, in a late number of *Arch. of Ophthalmology and Otology*, where myosis followed a gunshot wound of the cervical portion of the sympathetic; the pupil was small and would contract no more with calabar bean, V. $=\frac{20}{cc}$ with $-\frac{1}{18}$ V. $=\frac{20}{xx}$. A spasm of A. was proved by atropine, which dilated the pupil and reduced the refraction to $-\frac{1}{4}\frac{1}{2}$, where it remained after treatment; although from the nature of the injury there might have yet remained some paresis, yet we are here provided with a numerical estimate of the muscular tonus dependent upon integrity of the sympathetic, and of its antagonistic influence upon that power of accommodation which depends upon the third pair, and which in this case was able to induce an apparent M. of $\frac{1}{18}$.

I am not yet able to say why in myopic astigmatism the axis of the cylinder is found in one case coincident with the choroidal displacement, and in another at right angles to it. The signs of drag or displacement at the disk have a practical value in calling attention to astigmatism, and even slight defects may be thus recognized. Many of my cases have sought relief from asthenopia combined with conjunctivitis, blepharitis, etc., apparently out of proportion to the optical defects, which yielded to proper correction.

If we can assume that persons in prolonged near work, who are astigmatic, are under the necessity of making incessant use of antagonistic muscles of adjustment and convergence, we might expect serious consequences, and we would also have our attention directed towards a rational system of treatment by glasses, which, by affording mechanical aid, would supplant the therapeutic and other measures at present employed in vain in the cases of so-called progressive myopia. No expenditure of money or skill in re-arrangement of desks or school furniture can be of any service to an unsymmetrical cornea, in comparison with a glass which will harmonize its refraction and enable the eye to perform its complicated muscular functions as they are done with ease by emmetropic eyes.

Dr. Green.—We have all probably accepted as conclusive the strongly supported assertion of Donders, making myopia and staphyloma posticum almost synonymous terms (*Acc. and Refn.*, Syd. ed., p. 354). Several years ago, in reporting to this Society a series of cases of astigmatism (*Trans. Am. Oph. Soc.*, 1867–8, p. 136), and later, in commenting on an analysis of my own cases, which I had collected, with the very much larger published series of Snellen (*Trans. Am. Oph. Soc.*, 1871, pp. 105–7), I called attention to the fact that astigmatism is very often found associated with myopia, oftener, indeed, than with hypermetropia. Upon the very close relation existing between myopia and astigmatism I had insisted even somewhat earlier (*Am. Jour. Med. Sciences*, Jan., 1867, p. 118, and July, 1867, pp. 88 and 89), and had strongly advocated, in all cases of incipient or progressive myopia, the careful search for, and accurate correction of, any complicating astigmatism. At our meeting in 1871 (*Trans. Am. Oph. Soc.*, 1871, p. 107) I suggested further, in view of the very large proportion of cases of compound myopic astigmatism revealed by the analysis of the two published series, that astigmatism may probably often stand to myopia in the direct relation of cause to effect, and I ventured to assign to astigmatism a prominent place among the faulty conditions which may operate as exciting causes of myopia. Dr. Thomson's present observations, if confirmed by further investigation, would seem to show that in astigmatism the asymmetry of the refractive media is not the only important deviation from the normal condition, but that there is, in addition, a predisposition to irregular, and therefore especially dangerous, posterior distention of the globe, dependent upon asymmetry in form or development, of the eyeball as a whole. This view, of course, still further enforces the precept that even a low grade of astigmatism in the presence of a tendency to myopia is an important factor, perhaps one of the most important factors, in the case, and that to the accurate optical correction of the astigmatism, conjoined, as I think it should be in many cases, with systematic instillations of atropia, we must chiefly look for the control of the pathological process.

ON THE INCREASE OF REFRACTIVE POWER OF A PLANO-CYLINDRICAL LENS WHEN ROTATED ABOUT ITS AXIS. By Dr. G. Hay, Boston.

In the diagram Fig. 1, let P be the middle of the anterior or curved surface of the lens, and PM be a straight line in this surface (such line being parallel to the cyl. axis, and the tangent plane at this line being parallel to the plane surface of the lens). Let OP, the axis of the obliquely incident pencil, lie in a plane perpendicular to PM; this plane intersecting the curved surface of the lens in the line HP. Thus the lens may be more or less oblique to OP, but in such a way that the latter is always perpendicular to PM, which last may be called the axis of the lens.

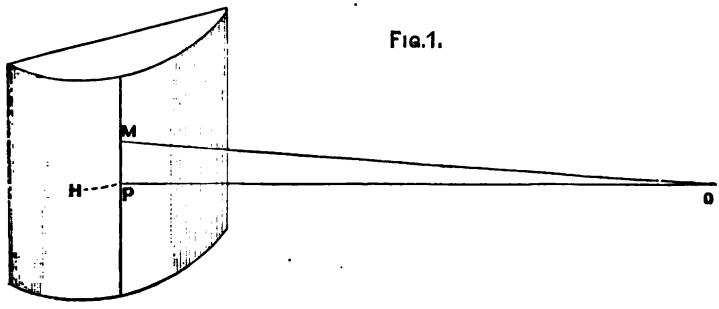


Fig. 1.

In considering the refraction of the homocentric pencil OPMH by the oblique lens we find that after refraction it becomes astigmatic.

The plane pencil OPH, in a plane perpendicular to the line around which the lens is rotated, remains after refraction in the same plane as before, and is refracted by the oblique lens in very nearly the same way as a direct pencil would be by a lens of focal distance.

$$f \times \frac{\cos.^2 \phi}{2\,(n \cos. \phi' - \cos. \phi)} \qquad [a]^*$$

* For principles according to which formula [a] may be obtained, see Parkinson's Optics, London, 1870.

f being the focal distance of the cylindrical lens,

ϕ representing its obliquity,

ϕ' the ang. of refraction corresponding to an angle of incidence ϕ, and n being the index of refraction, equal to 1.53, about.

The values of formula [a] for f = 100, and successive values of ϕ, are given in a communication by Prof. E. C. Pickering and Dr. Chas. H. Williams, on the "Foci of Lenses placed Obliquely," published in the Proceedings of the Am. Acad. of Arts and Sciences, 1874–5, New Series, vol. ii.

Copied below is a part of Table III., on p. 304, in which the number in the second column expresses the focal distance corresponding to the obliquity indicated alongside of it in the first column.

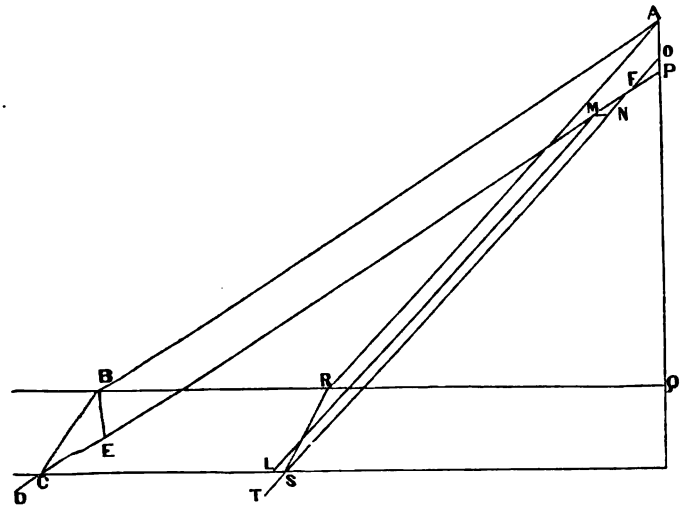
0°	100.0
5°	98.9
10°	96.1
15°	91.2
20°	84.8
25°	77.0
30°	68.4
35°	59.2
40°	49.8
45°	40.6
50°	32.0
55°	24.1
60°	17.1

The plane pencil OPM, which is at right angles to the one just considered, will be acted on by the oblique lens just as it would be by an oblique plate with plane parallel surfaces, one of them being the plane surface of the lens, and the other being the tangent plane at PM.

By referring to the diagram on p. 26 of the Society's Transactions for 1866, and reproduced here, it may be observed that the plane pencil just mentioned would have a virtual focus after refraction only a little different in position from its real origin before refraction; or, in the diagram referred to, the rays of an infinitely small plane pencil with its origin at A, its axis being AB, and its plane perpendicular to the plane of the diagram, would after refraction by the plate BCQ have approximately directions as if from point P (or really from points in the line AQ, and distant from P by infinitesimals of the second order). (See diagram on next page.)

Thus after refraction the infinitely small plane pencil OPM (Fig. 1) may be considered as emanating from a position nearly the same as its origin O before

refraction; and moreover it will meet the plane surface of the lens in a line* nearly parallel with PM; and therefore this refracted pencil may be regarded as being approximatively in a plane perpendicular to the plane of the pencil OPH after refraction; their respective foci being on the straight line corresponding to the ray OP after refraction.



The whole pencil OMPH may then be considered as after refraction somewhat approximating to the conditions referred to in the first two paragraphs of p. 92, of the Society's Transactions for 1871.

Thus we see that by rotating the plano-cylindrical lens as above, while not materially altering the refractive power in the plane passing through the axis of the lens and the origin of the pencil, we increase the power in a plane at right angles to this; that is, the oblique cylindrical lens is equivalent to a stronger cylindrical lens, nearly in position of the one before rotation, and with its cylindrical axis parallel to that of this latter. We can thus by more or less obliquity get the effect of a cylindrical lens of continuously varying power.

This increase of power may be demonstrated by the apparatus †

* The position of this line may be more accurately indicated. See Appendix to this communication.

† The instrument may be of service in some cases in selecting glasses for astigmatism. The axis of the oblique lens is fixed perpendicular to the axis of a straight tube, one and a half inches in calibre; the tube rests on a firm support, and may be rotated about its own axis; so that we can bring the axis of the cylindrical lens into any desired position, and then vary the power

shown in which a lens + $\frac{1}{10}$c. by successively increasing obliquity, neutralizes stronger and stronger concave cylinders, till at an obliquity of 60°, it neutralizes — $\frac{1}{12}$c.; the glass to be neutralized being placed about an inch from the middle of the oblique cylinder, between the latter and the test-object, letters No. XII. distant 13 feet.

The following is a table of successive concave cylinders neutralized by rotating + $\frac{1}{10}$c. in the circumstances just mentioned.

Obliquity observed, in degrees.	Neutralizes glass.	Obliquity observed, in degrees.	Neutralizes glass.
21 32½	— 60	52 53+ 55	— 18
27 30 35	— 48	54 55 57	— 16
37½ 39	— 42	56 58	— 15
42 43	— 36	56 58 59	— 14
47 48 49	— 30	58 59 61	— 13
48 50	— 24	60 61	— 12
50 + 52 — 52½	— 20		

APPENDIX TO THE PRECEDING COMMUNICATION.

On the refraction by a glass plate of an obliquely incident plane pencil whose axis is perpendicular to the intersection of the plane pencil with the first surface of the plate.

Consider (see Fig. 2) a plane pencil ARB′ incident obliquely upon a glass plate, and such that the axis AR of the pencil is perpen-

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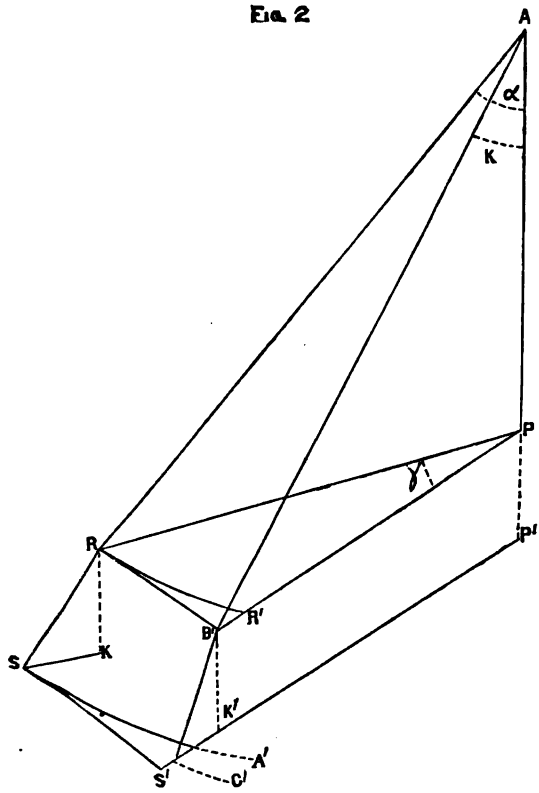
of the lens by altering its obliquity. An inch from the oblique lens, between it and the test-letters, is a place for another glass, spherical, or, if desired, cylindrical.

dicular to the intersection RB′ of the pencil with the anterior surface of the plate.

Fig. 2



RPB′SP′S′ represents a plate of glass with plane parallel surfaces.
APP′ is perpendicular to the plate.
A is the origin of the plane pencil of light considered.
α = angle RAP.
κ = " B′AP.
β = " SRK.
γ = " RPB′ = SP′S′.
κ' = " C′B′K′.
RR′ is circular arc in first surface, about P, with radius RP.
RB′ is tangent to RR′ at R.
SA′ is circular arc in second surface, about P′, with radius P′S.
SS′ is tangent to SA′ at S.
ARS is the course of ray AR.
RK is perpendicular to surfaces of the plate.
B′K′ is perpendicular to surfaces of the plate.

It is proposed to find where this pencil, when refracted, intersects the second surface of the plate.

Take $AP = p$

$PP' = t$

we have $SP' = SK + RP = p \text{ tang. } \alpha + t \text{ tang. } \beta$

$S'P' = SP' \text{ sec. } \gamma = p \text{ tang. } \alpha \text{ sec. } \gamma + t \text{ tang. } \beta \text{ sec. } \gamma$ [1]

$C'P' = B'P + C'K' = p \text{ tang. } \kappa + t \text{ tang. } \kappa'$

$= p \text{ tang. } \alpha \text{ sec. } \gamma + t \text{ tang. } \kappa'$ [2]

since $\text{tang. } \kappa = \text{tang. } \alpha \text{ sec. } \gamma$ [3]

Rays from A to arc RR′ will, after refraction, meet the second surface in arc SA′. But rays from A to RB′ will meet the second surface between the arc SA′ and its tangent SS′. To show this, consider the course of the ray AB′C′.

We have above the equations [1] and [2]. We shall show * that

$$\text{tang. } \kappa' < \text{tang. } \beta \text{ sec. } \gamma, \qquad [4]$$

whence it follows that

$$C'P' < S'P'$$

but

$$C'P' > P'A'$$

Since ray A R′ would meet the second surface at A′.

∴ C′ would lie between A′ and S′.

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* To prove that

$$\text{tang. } \kappa' < \text{tang. } \beta \text{ sec. } \gamma \qquad [4]$$

we have

$$\text{sin. } \kappa' = \frac{\text{sin. } \kappa}{n}$$

$$\text{tang. } \kappa' = \frac{\text{sin. } \kappa'}{\text{cos. } \kappa'} = \frac{\text{sin. } \kappa}{\sqrt{n^2 - \text{sin.}^2 \kappa}}$$

similarly,

$$\text{tang. } \beta = \frac{\text{sin. } \alpha}{\sqrt{n^2 - \text{sin.}^2 \alpha}}$$

and then

$$\frac{\text{tang. } \kappa'}{\text{tang. } \beta} = \frac{\text{sin. } \kappa}{\text{sin. } \alpha} \sqrt{\frac{n^2 - \text{sin.}^2 \alpha}{n^2 - \text{sin.}^2 \kappa}} \qquad [5]$$

The second member of [5] becomes by [3] equal to sec. γ, if instead of n we put 1.

We also have

$$\frac{n^2 - \text{sin.}^2 \alpha}{n^2 - \text{sin.}^2 \kappa} < \frac{1 - \text{sin.}^2 \alpha}{1 - \text{sin.}^2 \kappa}, \quad \text{since } \kappa > \alpha$$

$$\therefore \frac{\text{tang. } \kappa'}{\text{tang. } \beta} < \text{sec. } \gamma.$$

SOME PECULIAR PHENOMENA ATTENDING A CASE OF SUDDEN TEMPORARY LOSS OF HEARING AND SIGHT. By HENRY W. WILLIAMS, M.D.

MAY 13th, 1875, I saw a little girl of eight years, who six weeks before had suddenly become totally deaf. Four weeks later sight was also for a time completely lost, and the child, who had until now been able to understand what was said to her by watching the movements of the lips, could not be communicated with. This complete blindness seemed to continue during most of one day. After this, and until and at the time I saw her, these singular phenomena were observed: At intervals of a day or two absolute blindness for one or two hours, but during the intervening periods, although there was constant nystagmus when the eyes were left to themselves, and although the attention of the eyes was not arrested by a reflection of light into them from a gold watch or other bright object, yet if a person was so placed that the child's eyes were directed towards those of the other, her eyes instantly became fixed, she smiled, and seemed greatly delighted at perceiving something. Fixation continued as long as the observer's eyes were kept open; but the moment these were closed, the child's eyes began again to wander as if in search of the lost object, and continued to do so till the observer's face was placed so as to bring the eyes into the child's axis of vision, when the same look of delight, with fixation, was repeated. It made no difference whether the parents or any other person tried this experiment.

There being no history of severe cerebral symptoms, which must have existed if any intracranial lesion had occurred of such extent as to affect both the organs of hearing and of sight, Dr. J. Orne Green, who examined her ears without finding any abnormal change, and I, who had obtained no other than normal appearances on ophthalmoscopic examination, arrived independently at the conclusion that the cause of the symptoms was probably due to reflex irritation of the nervous system, arising from the presence of worms in the intestines.

On questioning the mother, she stated that a piece of flat, white worm, about an inch in length, had been observed in the stools.

Our advice was, that the parents should take the child home and submit to renewed treatment for the expulsion of tenia, which had

already been attempted by the family physician; and we had the satisfaction of learning, within a few days, that the expulsion of a large amount of tape-worm had been followed by a recovery of hearing and sight.

NOTE.—This case derives additional interest from the subjoined note by Dr. Green:

The child had always been considered healthy. Six weeks before I saw her, being then in apparently perfect health, she called her parents' attention to the fact that she did not hear well in the right ear; no pain or noises were complained of, and but little was thought of her remark. She slept well that night, but the next morning was totally deaf in both ears; there was no pain, headache, vertigo, staggering gait, noises, or other symptom. She ate, played, and slept well, but the deafness remained total, so that the parents were unable to find any sound which she could hear; there were no marked nervous symptoms.

Her mother had noticed that she had had an insatiable appetite, and once thought she had seen in the discharges something like tape-worm, for which pumpkin-seed and turpentine were administered without avail.

At my examination I found the pulse 96, full and regular; respiration normal; tongue clean; the ears were in appearance perfectly normal.

It was impossible to say whether she heard the tuning-fork on the head; a sharp whistle, blow, or shouting she certainly could not hear.

A note from her father, after their return home, informed me that after the administration of kousoo and pumpkin-seed, she passed white, thread-like pieces from the bowels, which were thought to be macerated tape-worm, and that the next morning on waking she exclaimed, "I see, I see, and I can hear too!" Both sight and hearing remained for a week, when the sight and then the hearing were again lost, but returned in a few days as before, and continued to alternate, sometimes both of the senses being perfect, and sometimes wholly lost. During one of the attacks the memory also was wholly lost for one day.

The intervals of good sight and hearing were increasing in length, and as the child was somewhat reduced in strength, further medication was stopped for a time, and since then I have heard nothing more from her.

TWO CASES OF VASCULAR DISEASE OF THE ORBIT.

Dr. Geo. C. Harlan, Phila.

Neither of the cases that I am about to report to the Society are new, but they are not on that account entirely without interest, as marked changes have taken place in each since they appeared in public before. They were under my care at the same time about six years ago. One of them I reported in the *Am. Jour. of Medical Sciences* for July, 1870, and a brief account of the other was given by Dr. Newton, in a paper on orbital aneurism in the same journal.

Case I.—Aneurism by anastomosis in the orbit. L. L., æt. 25. General health good. So long as he can remember the left eye has been prominent, and the left side of the head larger than the right. He can remember noticing, in his early childhood, a rushing sound in his head and eye. The following was his condition when first seen, six years ago: The deformity is very striking, as, besides the protrusion and distortion of the eye, the whole of the left side of the face is enormously hypertrophied. There is no œdema of the thickened soft parts; they are dense and firm. The beard is coarse, and grows much more rapidly on this than on the other side. The hypertrophy subsides gradually towards the upper part of the forehead, and does not extend to the scalp.

The external meatus of the left ear is nearly closed by the encroachment upon it of the anterior wall. The soft parts are so much thickened that it is almost impossible to determine if the bones are enlarged or not. The mucous membrane of the left side of the mouth is thickened, and the left side of the tongue is twice as large as the right, presenting, with its coarse papillæ, a marked contrast. His appearance is very suggestive of facial paralysis, and the tongue, when protruded, is directed towards the right side, but there is an entire absence of any kind of paralysis.

The left eye is enormously protruded, and is fixed in its distorted position downwards and outwards, the upper border of the cornea being a quarter of an inch below the lower border of the other cornea. He can count fingers with that eye, but has no useful vision. The lids are distended, and still cover the eye. Immediately above the

eyeball, and lying more towards the inner side, there is a distinct tumor of almost cartilaginous density; it is flattened from above downwards, and its narrow edge projects beyond the orbit. In this tumor, and the ball with it, there is a pulsation strong enough to communicate an evident motion to the head of the auscultator. There is a loud aneurismal bruit, which is not only a source of annoyance to the patient himself, but can be heard by others at some distance from his head. There is a doughy swelling of the soft parts, extending about an inch above the orbit, in which strong pulsation can be felt. Pressure on the left carotid stops all pulsation, and the tumor becomes soft and compressible, and can be pushed back into the orbit. A vascular tumor, formed by engorgement and hypertrophy of the inferior palpebral fold of the conjunctiva, almost conceals the cornea, and not only greatly increases the deformity, but occasions a good deal of pain, being constantly irritated and inflamed from exposure. It has also bled quite freely several times, and was the immediate cause that brought the patient to the hospital. This conjunctival tumor was removed in several operations by means of constriction with silk ligatures, and the patient, not caring to undergo further treatment, left the hospital.

Dec., 1874. He called on me again, on account of trouble in the right eye. He states that about a year ago the sound in the left eye commenced to diminish, and is now very rarely heard. Last spring the bulging of the left eye increased, and about the same time he noticed an enlargement of the vessels on the forehead. Two or three months ago his attention was called to the bulging forward of the right eye, and lately his vision has failed.

There has been very little change in the appearance of the left eye; it is, perhaps, a little more protruded. The aneurismal bruit has decidedly diminished, and is now heard only directly over the tumor. The sound cannot be heard on auscultation of the temple, nor is it heard by the patient himself. The ophthalmoscope shows the media clear, the disc atrophied, the retinal arteries contracted, and the veins enormously contorted and engorged. It also shows an hypermetropic refraction of $\frac{1}{8}$, which, supposing the eye to have been originally emmetropic like the other, proves that its antero-posterior diameter has been shortened by the pressure to the extent of one millimetre and a quarter. The supra-orbital and frontal arteries are much enlarged, and can be plainly seen to pulsate. None of the other vessels on that side seem affected, but the varicose condition extends down the angular branch of the facial on the right side. Aneurismal fremitus

can be distinctly felt in this artery for an inch or more below the internal angle of the eye. The pulsation in all these vessels is immediately stopped by pressure on the left carotid. The vessels on the right side of the forehead are not affected.

There is a very evident exophthalmus of the right eye, but no pulsation. It can easily be pressed back into its normal position, but instantly bulges forward again when the pressure is removed. The larger conjunctival veins are in a varicose condition, forming quite broad red lines radiating from the edge of the cornea. V.= $\frac{20}{40}$. Refraction = Em. Disk slightly hyperæmic, but not at all swollen. Retinal veins engorged.

He was ordered a sedative and astringent wash for the right eye, and atropia was used to diminish the irritation of the left. Has general directions about his mode of life, etc., and to keep the left eye more completely protected.

May, 1875. Much improved. V. O. D. $\frac{20}{xx\,(?)}$ but complains of night blindness. Cannot trust himself in the street alone after dusk. Protrusion O. D. rather less, varicose condition of vessels of forehead diminished, and thrill in angular artery of right side hardly perceptible.

Ophthalmoscope shows in O. D. rather less engorgement of retinal veins, but margin of disk hazy and indistinct, and contour of vessels in its neighborhood not clear—indicating œdema.

I think that there can be little doubt of the character of the affection in this case. Its congenital origin, the hypertrophy of the whole side of the face, the involvement of some of the external vessels, and the evident extension of the disease beyond the orbit to the subcutaneous tissue of the brow, point definitely to aneurism by anastomosis. The disease is not confined even to the internal carotid and its branches, as is shown by the excessive nutrition of parts that receive their blood from the external carotid. I have not been able to satisfy myself whether the protrusion of the other eye, recently noticed, is the result of venous obstruction from the extension of the disease behind the orbit, or whether the disease is creeping over into the right orbit from in front, by means of the free anastomosis at the root of the nose. On either supposition it is difficult to account for the only serious symptom remaining, which is, unfortunately, very marked, of night blindness.

The question of treatment has given me a good deal of anxiety. Not much is to be expected from compression, though I have made a not very successful attempt to teach the patient to control the

artery himself. The disease seems to be too extensive, and not sufficiently defined to be treated by injection, which at best is an uncertain and dangerous remedy. There remains the question of ligature of the carotid, which some of my surgical friends have strongly urged, but I hesitate to insist upon it, because of the danger it involves, and of the fact that the patient is able to attend to work and support his family, and, above all, because the records of surgery show that the treatment of aneurism by anastomosis, and cirsoid aneurism by distal ligature, has been extremely discouraging in other localities, and, at the same time, furnish good reason for suspecting that its reputed exceptional success in the same form of disease in the orbit has been founded in mistakes in diagnosis.

Case II.—Pulsating exophthalmus following injury.

The following history of this case is taken from the *Am. Journal of Med. Sciences* for July, 1870. S. G., æt. 25—a robust man—brakesman on the Penn. R. R., was admitted to Wills' Ophthalmic Hospital, August 14th, 1869. On the 20th of June, 1868, while standing on the platform of a car in motion, he received a violent blow upon the head from another car, moving in the opposite direction, on a side track, which fractured the lower maxilla on both sides, and inflicted several scalp wounds. He stated that he was partially insensible for three weeks, and that when he returned to consciousness his right eye was very prominent, and that he "heard a roaring sound, like falling water, in his eye," with every stroke of the pulse, which he had never been free from since. A "red tumor," which had appeared on the right eye, partly covering the pupil and interfering with vision, had been cut out by his medical attendant. A cicatrix in the conjunctiva, at the inferior palpebral fold, proved the tumor to have been a chemosis.

The left eye commenced to protrude in about two months.

At the time of his admission, fourteen months after the injury, there was great exophthalmus of both eyes, greater of the left, which seemed almost dislocated, the equator of the ball being in front of the edge of the orbit. The left ball could be pressed back into its proper position and easily held there, without pain to the patient, but immediately bulged forward again when the pressure was removed. The right eye resisted pressure, its position could not be altered, and strong pressure gave pain. He had excellent binocular vision; accommodation = $\frac{1}{4}$; pupils freely movable, and ophthalmoscopic appearances normal.

In addition to the "sound in the eye" referred to, he felt every

arterial pulsation "like a little jerk all over his head," and coincidentally there was a slight apparent motion of any object that he looked at steadily; on auscultation a loud aneurismal murmur could be heard over any part of the head or face, most distinctly over the right temple. This murmur, as well as the pulsation, was entirely stopped by pressure on the right carotid. There was never any pulsation of the left ball. During the pressure on the artery the right ball could be replaced. No effect was produced upon either eye by pressure on the left carotid, or upon the left eye by pressure on either artery.

Complete digital pressure of the right carotid was kept up continuously from three P.M. until eleven P.M.—a period of eight hours—the pulse ranging in the meantime, under the influence of veratrum, from 44 to 56. The murmur, though still quite distinct, was now much less loud, and altered in character. The patient stated that the "roaring was fainter and had a shriller sound" after this intermittent pressure was applied from four to six hours daily, principally by the patient himself, who learned to control the artery better than any one else; he accomplished it sometimes by the thumb, sometimes by a tourniquet I had made for the purpose, and sometimes by means of a contrivance of his own, consisting of a stick about a foot long, with the end properly shaped and padded, which he pressed against the artery and held in his hands or rested on a table. The diminution of the sound continued, and the exophthalmus was decidedly lessened, particularly of the left eye, making an evident change for the better in the patient's appearance.

This treatment was continued for five weeks, during the last two of which no progress was made. Continuous pressure was then again tried, being kept up by relays of students for twenty-four hours, but with scarcely any effect. The patient then left the hospital, expressing himself satisfied that the improvement attained fully compensated him for all he had endured. Eight or nine months afterwards he wrote me that he had resumed his occupation of brakesman, and that the former condition of his eyes had returned; that he was no better than when he entered the hospital.

November 17th, 1870. About six months later he wrote again that he had been keeping up intermittent compression, at frequent intervals each day, and was improving. Two years after this time, November 9th, 1872, his brother called at my office to say that the prominence of both eyes had entirely disappeared. There was still some sound, and he continued to practise occasional compression for

several months longer (more than three years after the commencement of treatment), when all symptoms had disappeared.

Of course there is a possibility that this may have been a case of spontaneous cure. I find three cases reported, two by Erichsen (*Science and Art of Surgery*, Am. Ed., vol. ii. p. 108), and one by Dr. E. L. Holmes, of Chicago (*Am. Jour. Med. Sciences*, July, 1864), in which all the symptoms of orbital aneurism disappeared under medical treatment, without either ligation or pressure. They were all of traumatic origin. The duration of the disease was, in one case, one year, in another eighteen months, and in the third, three years and a half. There is, however, sufficient ground for connecting the compression with the result, to justify us in giving this kind of treatment a more prolonged trial than has usually been done. The following extract from the patient's letter will show the immediate effect of each compression:

"I kept up the compression on the artery until about two years ago, when a perfect cure was effected. I could have been relieved of the task of compressing the artery sooner, if I had confined myself more closely to it, but as long as it did not give pain I seldom compressed it; but as soon as it would pain I would put my thumb on the artery, often without noticing what I was doing, as I got so accustomed to it that it was no task. After removing my thumb from the artery, it would be but an hour or two until I would have a slight pain. So the compression was kept up several hours a day."

Compression of the carotid has been tried in a number of cases, but only two instances of success are recorded, those of Gioppi and Scarramuzza (Hart, *Lancet*, March 15, 1862). In the case reported by Freeman, of Canada, the pressure was made not on the artery, but directly over the tumor (*Am. Jour. Med. Sciences*, No. 103, p. 277).

Gioppi made intermittent digital compression, suspended every few minutes, for a few hours, during four days. In the other case the cure was effected by intermittent compression, occupying seven hours and twenty minutes, in the course of eighteen days.

Galvano-puncture failed in the hands of Bourguet and Pètuqin, though ligature of the carotid proved equally unsuccessful in the latter case; six cases of cure by injections have been reported (Noyes, *N. Y. Med. Jour.*, vol. viii. p. 666), and the brilliant success of ligation of the carotid is well known.

When the case of S. G. was reported before, I had not the slightest hesitation in calling it an "orbital aneurism," but the more I have looked into the subject the less confident I have been of my opinion,

and in view of the admitted difficulties of diagnosis, and the many recorded mistakes of the high authorities, I have thought it safer to retire behind the comprehensive term of "pulsating exophthalmus."

Following the view maintained by Travers in his report of the first case in 1809 (*Med. Chirurg. Trans.*, vol. ii. p. 1), no one, for thirty years, seems to have had a doubt that these cases of so-called aneurism of the orbit were all of the anastomotic variety. Then Busk's paper (Id., vol. xxii. p. 124) threw a doubt on this, and it was pretty generally held that they were of the ordinary spontaneous or traumatic kinds, until Nunnely, in 1864, maintained that "in the great majority of such cases of protrusion of the eyeball there is no disease whatever in the orbit, but that the symptoms depend on obstruction to the return of blood through the ophthalmic vein."

There is good ground for believing that this view is correct, and that orbital aneurism is, to say the least, an extremely rare disease.

In the decision of questions of pathology, the post-mortem room may be considered the supreme court, and, with the exception of the complicated case briefly recorded by Guthrie (*Operative Surgery of the Eye*), who attributed the protrusion of the ball as much to an extensive hypertrophy of the recti muscles as to the aneurism, we are still, so far as I can learn, without positive proof that such a thing as an aneurism in the orbit has ever existed.

The following post-mortem records, which are all that I have been able to find, speak for themselves, and it may be taken for granted that a post-mortem examination that proves a mistake is, at least, not more likely to be published than one that confirms the previous diagnosis.

I. Reported by Nunnely (*Med. Chirurg. Trans.*, 1864). Diagnosis, orbital aneurism. Origin, spontaneous. Ligature of carotid. Post-mortem, ophthalmic artery "considerably enlarged," but principal disease in the carotid, which was decidedly dilated as it emerged from the bony canal.

II. Nunnely (Ibid.). Diagnosis, orbital aneurism. Spontaneous. Ligature of carotid. P. M., eighteen months afterwards, pressure on cavernous sinus and ophthalmic vein by a malignant growth.

III. Nunnely (Ibid.). Diagnosis, orbital aneurism. Spontaneous. Ligature of carotid. P. M., four and a half years after, circumscribed aneurism of ophthalmic artery, just at its origin on the right side of the sella turcica, as large as a hazel nut; arteries of the orbit of very small size.

IV. Bowman (*R. L. O. H. R.*, ii., p. 6). Diagnosis, orbital

aneurism. Traumatic. Ligature of carotid. Death from hemorrhage. P. M., cavernous sinus and ophthalmic vein, at its origin, obstructed by clot from phlebitis. Mr. Bowman states positively that "all the physical signs of orbital aneurism were present in a marked degree" in this case.

V. Nélaton. Traumatic. Diagnosis, according to Dr. E. L. Holmes (*Am. Jour. Med. Sciences*, July, 1864), who saw the case at Nélaton's clinique, "aneurism of ophthalmic artery;" according to Dr. Delens, of Paris (quoted by T. Holmes, *Lancet*, Aug. 2d, 1873), wound of internal carotid. No operation. P. M., aneurismal varix from direct wound of carotid and cavernous sinus.

VI. Nélaton (Holmes, *Lancet*, Aug. 2d, 1873). Traumatic. Exophthalmus, pulsation, bruit. Small, rounded, movable pulsating tumor at upper and inner part of orbit. Intense chemosis. Diagnosis, aneurismal varix between carotid and cavernous sinus. Ligature of carotid. P. M., wound of carotid and cavernous sinus by spicula of bone from fracture of base of skull.

VII. Baron (Ibid.). Exophthalmus and intense bellows murmur over the eyeball. Spontaneous. P. M., aneurism of carotid in cavernous sinus.

VIII. Gendrin (Wecker, *Mal. des Yeux*, vol. ii. p. 806). Diagnosis, orbital aneurism. Spontaneous. No operation. P. M., obstruction of cavernous sinus and ophthalmic vein by clots. Arteries also diseased, but nothing like an aneurism.

IX. Aubrey (Ibid.). Diagnosis, aneurism of ophthalmic artery within the orbit. Spontaneous. No operation. P. M., great dilatation of cavernous sinus and ophthalmic vein.

X. Lenoir (Ibid.). Diagnosis, aneurismal tumor within the orbit. Supposed to be traumatic. Ligature of carotid. Death nine months after. P. M., encephaloid tumor of the orbit.

XI. Hamilton (Noyes, *N. Y. Med. Jour.*, vol. viii. p. 666). Diagnosis, not given. Spontaneous. Ligature of carotid. P. M., malignant growth in orbit.

XII. Richet (*Oph. Congress*, 1868). Diagnosis, pulsating tumor of the orbit. Exophthalmus, pulsation, loud bruit. Spontaneous. Ligature of carotid. P. M., dilatation of ophthalmic vein from phlebitis. No affection of any artery.

XIII. Eltingen (*Klin. Monatsbl.*, Feb., März, 74, p. 58). Diagnosis, suspicion of aneurism, but probably venous thrombosis. Exophthalmus, pulsation, bruit. Spontaneous. No operation. P. M., two years afterwards, partial obliteration of orbital veins, but no change in the arteries.

XIV. Morton (unpublished). Diagnosis, post-orbital aneurism of ophthalmic artery or carotid. Exophthalmus and bruit, but no pulsation. Spontaneous. Ligature of carotid. P. M., venous obstruction from clot, but nothing like an aneurism.

An analysis of these fourteen cases gives:

Venous clot from phlebitis, 4 cases.

Venous dilatation from phlebitis, 2 cases.

Malignant growths, 3 cases.

Post-orbital aneurism, 3 cases.

Post-orbital varix, 2 cases.

Competent observers had committed themselves to the diagnosis of orbital aneurism in nearly all these cases, and in the remainder the same conclusion could hardly have been resisted by any surgeon whose attention had not been particularly called to the subject. In only five cases was there anything like an aneurism, and in them the arterial lesion was so situated that it could be the cause of the orbital symptoms only in the same manner as any other obstruction to the venous flow might be.

Since the above was written, I find in *The Lancet* (April 3d, 1875) a condensed report of a paper on pulsating tumor of the orbit, read by Mr. Walter Rivington before the Royal Med. Chirurg. Society, whose Transactions contain so large a proportion of the literature of this subject. Twelve cases in which examination was made after death are referred to, but as the paper is not yet published, I have no means of knowing how many of his cases are not included in the list that I have given. A very interesting discussion followed the reading of the paper, during which Sir James Paget made the following remarks upon the cause of the pulsation in these tumors: "The conditions of pulsation of other tumors situated in bony cavities might throw some light on the mode of its occurrence. Any swelling lying in a bony cavity, even when there is no large cavity behind it, will pulsate. Thus, in a recent case of tumor of the antrum, in which there were no large vessels, there was distinct pulsation. Mr. Stanly has also collected and published cases of similar pulsating tumors of bone. A tumor of any sort in a cavity may receive a communicated pulsation from vessels of small size in the walls of the cavity. Another similar condition often seen is that of a cavity in a necrosed bone filled with pus, in which the fluid resting there shows a distinct pulsation visible to the eye. Such a hollow bone, with blood-vessels in its walls, is precisely similar to a bony cavity, such as the orbit, which, to complete the analogy, is full

of fat, which is really fluid at the ordinary temperature of the body."

The same thing is well illustrated by the pulsation at the bottom of the external auditory meatus, which forms a familiar symptom of perforation of the membrana tympani. The pulsation and exophthalmus are natural enough results of venous obstruction, but the cause of the aneurismal bruit, which has been so often noticed without arterial disease, is not so plain. It is probably the result of constriction of the carotid artery by pressure.

After all that has been said and written about orbital aneurism in the last seventy years, we cannot yet avoid the conclusion that we have no means of detecting it with any degree of certainty. In the words of Mr. T. Holmes, "At present all we can say is, that the symptoms of orbital aneurism are, in some cases, exactly imitated by cases in which only the venous system is affected." One point that may be considered pretty well established is, that there is scope for much deliberation and some modesty in the matter of diagnosis.

The Society adjourned to meet Friday morning at 9.30.

July 23, 1875.

The Society met at 9.30 A.M. The President, Dr. Agnew, in the Chair. The minutes of the last meeting were read and accepted.

Dr. Prout made the following motion, which was adopted:

"It is recommended that the printed Reports of Special Public Institutions for the Treatment of Diseases of the Eye and Ear, with which members of this Society are connected, be sent by them to all their fellow-members."

In behalf of the Committee appointed for the purpose of selecting a subject for discussion for the next annual meeting, Dr. Kipp recommended the following: The Nature and Treatment of Tumors of the Optic Nerve.

CASE OF SECTOR-LIKE DEFECT OF FIELD OF VISION.

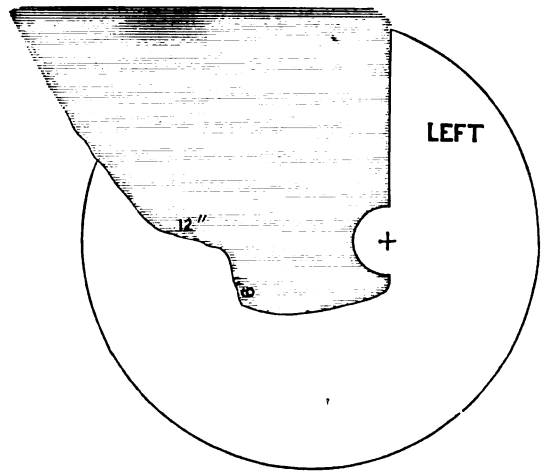
By Wm. Thomson, M.D., Philadelphia.

In the Proceedings of the Society for 1871, I reported a case of complete hemiopia, the result of a severe gun-shot wound of the left parietal region, in which the line of blindness diverged to some extent at the point of fixation towards the blind side of the field. A similar case has now presented itself, and will be briefly detailed.

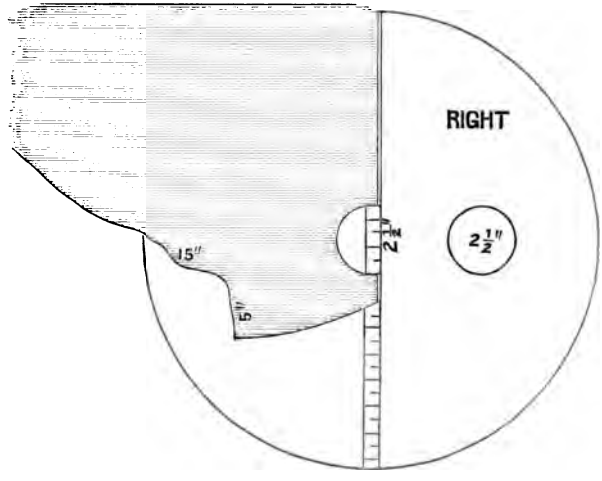
S. L., aged 50, a carpenter, and in good health at present. Four years ago was overcome by a sudden vertigo, was insensible for a few moments, his hands were numb for several days. His sight was disturbed then, and has so remained without change until the present date. The eyes present no sign of disease on inspection. V. in each is $\frac{1}{1}$.

There is no evidence of glaucoma. Each fundus is free from change; in each nerve there is a large physiological excavation, perhaps a little too white. There is no lesion or change in vision beyond a partial loss of field in the upper and left quadrant. The insensitive portion of the retina was easily recognized on placing the patient at some distance from a light, and throwing its image on various parts of the retina, and learning from the patient where the light was seen or lost to view. The field was further examined by the blackboard and piece of chalk, the man being placed sixteen inches from it; Mariotte's spot in the R. was found to be about $2\frac{1}{2}$ inches in diameter, but in the L. it could not, of course, be determined, since it was situated in the lost portion of the field. From the sketch of each field it will be seen that the line of blindness is vertical above the point of fixation, but that it diverges towards the blind side a short distance above it, describes a half circle, and returns to the vertical line below, from which it descends towards the left for fifteen inches, then rises to the horizontal line, and thence passes upwards, and to the left to the periphery of the field. In the case published in 1871, it seemed that at the region of the fovea, the elements from each side of the brain might be intermingled, and that thus the full V. might be accounted for in cases where severe lesions were known to have occurred in one hemisphere. An effort was made to test this idea in this case where the loss of a quadrant of each field was only felt as

an inconvenience, and where there was the full acuity of vision at the point of fixation, and at the same time, to measure the dimensions



of the space where sharp sight yet remained. The man was a carpenter, accustomed to make careful observations, and I chose a tool with which he was familiar. An ordinary rule, with the foot-scale



clearly marked on it, was placed vertically on the blackboard, with its upper half in the lost part in the field; it was then pushed slowly

towards the perfect part of the field until its right edge was just visible, the remainder being in the blind part. The man then himself remarked, that at or near the point of fixation, the entire width of the rule was clearly seen; and this portion was found to measure from above downwards 2½ inches.

From the history of the case there is little doubt that four years ago there was an apoplectic attack which induced the partial hemiopia, and that it was caused by a lesion of the left side of the brain. All traces of paralysis had long since disappeared, and there had been no change since the first day in the condition of the eyes. The man was intelligent and a good observer, and great care was taken to verify the fact that at the fovea the blindness was not vertical, as it was both above and below. An autopsy is yet required to give the case value.

Dr. Roosa offered the following resolution, which was carried:

Resolved, That it is the sense of this meeting, that the session of the Society for 1877 should be held at Put-In Bay.

Dr. E. Williams offered this resolution:

Resolved, That the sense of this Society is in favor of New York as the place for the meeting of the next International Ophthalmological Congress. This was carried.

Dr. Roosa moved that the Report of the Committee be accepted, and that the officers therein named be re-elected.

For *President.*—Dr. C. R. Agnew, New York.
" *Vice-President.*—Dr. G. Hay, Boston.
" *Recording Secretary and Treasurer.*—Dr. Richard H. Derby, New York
" *Corresponding Secretary.*—Dr. H. Althof, New York.
" *Publishing Committee.*—Dr. H. D. Noyes, and Dr. E. G. Loring, New York.

The Committee's Report was accepted, and the above officers were unanimously re-elected.

The following notice was presented by Drs. Dix and Williams, of Boston.

OBITUARY NOTICE.

Dr. Edward Delafield, the first President of the American Ophthalmological Society, died at his residence, in New York, on

Saturday, the 13th of February, 1875, in the eighty-first year of his age.

Dr. Delafield was the son of John Delafield, who held for many years a high position in the mercantile community.

He graduated at Yale College in 1812, and at the College of Physicians and Surgeons in 1815.

After serving in the New York Hospital he pursued his studies abroad, chiefly in London, as a pupil of Astley Cooper and Abernethy. On returning to his native country, he established, in 1820, in connection with the late Dr. John Kearney Rodgers, the New York Eye and Ear Infirmary. Of this institution he was an attending surgeon for thirty years, and was afterwards elected consulting surgeon and vice-president. He manifested through life the warmest interest in its prosperity, and much of its great success may be credited to his active labors and wise counsels.

In 1834 he was appointed one of the attending physicians of the New York Hospital. In 1825, when comparatively a young man, he was appointed Professor of Obstetrics and Diseases of Women and Children in the College of Physicians and Surgeons, and continued to fill that chair with signal ability until 1838, when his increasing practice obliged him to resign both his professorship and his position at the hospital. He was a founder and the first President of the Society for the Relief of the Widows and Orphans of Medical Men. In 1858 he was elected President of the College of Physicians and Surgeons, and became a member of the Board of Governors of the Roosevelt Hospital. As President and Chairman of the Building Committee, his labors were unwearied in perfecting the organization of the hospital.

As a teacher Dr. Delafield was quiet, clear, methodical in his views; terse, elegant, and distinct in his mode of expressing them. No man more completely held the attention of his class, as in his earnest, dignified, and effective manner he laid before them the truths of medicine, and the great responsibilities involved in the practice of their noble calling.

As a practitioner, Dr. Delafield possessed, in a high degree, the confidence of his patients. His medical sagacity and extensive acquirements secured him success in the management of disease, and the kindly interest and sympathizing care which he felt for those entrusted to his skill gained for him their affection and gratitude.

Dr. Delafield took a prominent part in the organization of this Society in 1864. His unanimous election as its first president was a

fitting acknowledgment of what had been done by his example and efforts, during many years, to make Ophthalmology, as a department of medical practice, honorable in the estimation of the profession and useful to the public.

During the four years that this Society had the privilege of retaining his name at the head of its list of officers, and until the close of his life, Dr. Delafield showed a warm interest in the prosperity of the Society as evidenced in the enlargement of its membership and the increasing value of its published proceedings.

The death of such a man—energetic, skilful, honorable, courteous, as he was—is a loss to the whole community in which he lived; but it must be especially felt by the profession, of which he was so eminent a member, and, above all, by this Society, of which he had been a founder and a constant friend.

ON THE EFFECT OF A CYLINDRICAL LENS, WITH VERTICAL AXIS PLACED BEFORE ONE EYE. By O. F. WADSWORTH, M.D., Boston, Mass.

AN interesting phenomenon in physiological optics, which, to me at least, is new, was observed in the following case:

Mr. N., a draughtsman, aged 26, consulted me March 6, 1875. The right eye he considered normal. With the left he had never seen well, and it was of little use, but he had noticed no change in it. He hoped a glass might be found to improve the sight of this eye. Functional examination gave: Right, without a glass, V. $=\frac{15}{20}$, with -48 cylinder, axis 135°, V. $=\frac{15}{16}-$. This glass, or $+48$ cylinder, axis 45°, increased somewhat the distance at which he could read $1\frac{1}{2}$ Sn. (18″ to 22″). Left, without glass, V. $=\frac{1}{10}\frac{5}{0}$, with -13 cylinder, axis vertical, V. $=\frac{1}{5}\frac{5}{0}$. The fundus appeared normal in both eyes.

He was advised to procure -13 cylinder, axis vertical, for the left eye, and to wear it a certain time each day, while keeping the right eye covered, in the hope that vision might, by this means, gradually be improved. The improvement for the wearer caused by $+48$ cylinder before the right eye seemed to him sufficient to make it worth while to wear it. The two glasses were therefore ordered—to be placed in separate frames.

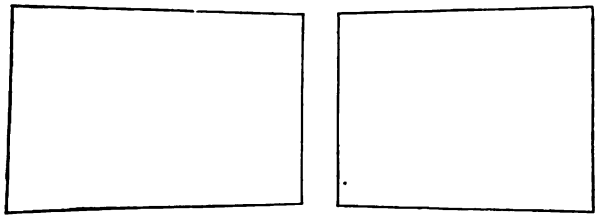
Five days later he came to me again. He had had both glasses placed in the same spectacle frame, and complained that when he kept both eyes open he saw "perspectively," *i.e.*, parallel horizontal lines appeared as if they converged toward a vanishing point at the left hand. I found, on examining him, that this appearance was not very marked, and if the parallel lines were pretty far apart he needed a moment's attention to determine their convergence; still it was enough to decidedly inconvenience him when at work on plans, etc. Very probably but for his training as a draughtsman, which had taught him accuracy of observation as to the mutual relations of lines, the apparent convergence would have passed unnoticed.

The cause of the phenomenon was not at first clear to me, but, on consideration, the following explanation appears satisfactory: When,

both eyes being normal, an object, for example a parallelogram, is held directly in front of the eyes, perpendicular to the visual axis, the separate images formed upon the two retinas are not exactly like either each other or the object. The left end of the parallelogram being nearer the left eye than the right end, its image on the retina of this eye is larger than the image of the right end, and conversely, the image of the right end of the parallelogram is the larger in the right eye. These two unlike images are unconsciously combined in the brain to give a single visual impression, the smaller end of each single image being fused with the larger end of the other. Under the conditions given, the smaller ends of the two images are equal, and the larger ends also equal, so that the average obtained by fusing either large end with the opposite small end is the same, and the impression produced is that of a rectangle.

If, now, a concave, cylindrical glass, with vertical axis, is placed in front of one eye, the image for that eye is shortened in the horizontal direction, a portion being cut off from either end, so that the small end is not so small, or the large end so large as those of the image in the other eye. These two unequal images also are combined in the brain to give a single visual impression. Here, however, the average obtained by the fusion of the large end of the longer image with the small end of the shorter image is greater than that obtained by the fusion of the large end of the shorter image with the small end of the longer image; the resulting impression, therefore, is not that of a rectangle, but of a rhomb lying with its smaller end toward the side of the eye before which the glass is placed.

It is, of course, assumed in the above statement that the image formed by the aid of the cylindrical glass is a distinct one, as would be the case if the glass corrected an existing astigmatism.



To test the correctness of the explanation the accompanying diagrams were constructed.

They represent the outlines of such images of a parallelogram as

would be found on the retinas of the two eyes under the given conditions. When these diagrams are placed in a stereoscope the result of their fusion is to produce the appearance of a rhomb, its narrower end toward the side on which the shorter figure is situated. The experiment, therefore, supports the theoretical explanation.

A CASE OF GENERAL SARCOMA OF THE CHOROID, PROBABLY CONGENITAL. By Dr. R. J. McKay and Dr. H. C. Eno.

On November 23d, 1874, Arthur Pack, aged then one year and ten days, was brought to the "Eye-class" of the Out-Door Department of Bellevue Hospital. The mother stated that this was her third child, and that the other two children were healthy. He was born after a natural labor. At birth nothing unusual was observed. But the next day the right eye and right side of the face seemed swollen. They continued to enlarge as he grew older, but never rapidly.

At three and a half months of age he was taken to Dr. Agnew, who advised to let him alone until older, but thought his right eye might subsequently have to be removed. When first brought to me his appearance was striking; the right cheek was much larger than the left, and it hung lower also. There was an exophthalmus of right eye of about half an inch, and the eye was enlarged. It had a very deep anterior chamber, and was in a state of chronic irido-choroiditis. The pupil was somewhat dilated, and very slightly movable under strong light. The sclerotic was thin and bluish in color. The lids of the right eye, and especially the upper one, were very much enlarged, and almost double the size of its fellow. The movements of the right eye, downwards, and outwards, and upwards, and inwards, were very slight. Nothing unusual could be felt by digital pressure around the orbital edges.

A faint red reflex at the upper part of the pupil, when the eye was turned downwards and inwards, was all that could be discovered with the ophthalmoscope. The left eye was markedly intolerant of light. It manifested continual, horizontal, oscillatory movements, which prevented an ophthalmoscopic examination. His mother stated that he had always dreaded light, and had those movements of the left eye, and that he could always see quite well with it. An examination of his mouth showed that the right side of the posterior two-thirds of the bony palate was distended and enlarged, feeling as if some absorption of that bone had occurred. The median line of union of the palate bones curved to the left, and was very high. There was a small poly-

poid growth from the gum of the right upper alveolar ridge, at the junction of the canine and molar regions. The right upper maxilla seemed enlarged in every direction, apparently by distention from a tumor of the antrum, and there was an unusual enlargement and growth of its alveolar portion. Also the right side of the head seemed larger than the left in every way. There seemed to be an occlusion of the right occipital vein, or an unusual growth over its site, of about two inches in length. The right nostril was partially closed. Symptoms of sympathetic ophthalmia of the left eye were well marked, and for its relief, as well as the cosmetic effects, the enucleation of the right eye was proposed, and done December 3, 1874. The operation was easily performed, and not followed by an unusual amount of hemorrhage.

The conjunctiva was not adherent. The muscles were very thin and greatly stretched. The lower orbital wall was pushed up, and its surface slightly convex, which considerably diminished the cavity of the orbit. No tumor was found in the orbit. A tumor occupying the antrum was supposed to be the cause of the diminution in size of the orbital cavity. Two days after enucleation the photophobia had disappeared entirely, and even when the child was taken to the window, he would look out upon the snow. The nystagmus was also less marked, and fixation better. Œdematous swelling of the lids and ocular conjunctiva continued for some days, but disappeared entirely in about two weeks. Patient was not seen again until April 2, 1875. He had done well until within two weeks, when his right upper lid began to turn out again. I learned the child had been recently weaned, and was quite fretful, and considered it due to that, because when he cries the lid turns up more or less. There has been a marked improvement in the appearance of the child. There is now very little nystagmus, and no photophobia. The lower lid looks quite natural, and the upper one is much smaller than when last seen. The marked difference in the two sides of the head has almost entirely disappeared, but the cheek looks larger and hangs lower. The right nostril is slightly larger and more open than the left, whereas it was nearly closed on December 3, 1874. The polypoid growth of the alveolar process is not present, but from the same locality there is an extension from the alveola to the cheek of the same unusual appearances of an alteration of the normal tissues, and a small tumor is felt in the cheek near the angle of the mouth. Several more teeth are observed, and the enamel has fallen off of the left lateral incisor, and the altered appearance of the alveolar surface extends further to the left.

There are some enlarged anterior cervical glands. Patient was seen by Dr. A. Jacobi, who thinks that the disease was probably a sarcoma, which started early in fœtal life from the dental papilla, and that it extends into and encroaches upon the cavity of the antrum.

Dr. H. C. Eno has made a microscopic examination of the eye, and reports as follows:

EXAMINATION OF THE EYEBALL.

The eyeball is very large, measuring 30½ mm. in the antero-posterior diameter, and 25 mm. in the transverse diameter (the usual measurement for a child of this age being 22 mm. by 21 mm.). The cornea is enlarged and protuberant, its horizontal diameter measuring 17 mm. The eye was opened by a section passing through the horizontal meridian. The anterior chamber was found to be very deep, measuring 3½ mm.; the posterior chamber was also deep, measuring about 2 mm., so that the anterior surface of the lens was not less than 5½ mm. from the posterior surface of the cornea. The lens is held in position by the suspensory ligament passing from the surface of the ciliary processes, and is transparent. The vitreous is transparent, and normal in appearance. The retina is in apposition with the inner surface of the choroid throughout the entire extent of the fundus; and the papilla and nerve present no unusual appearance, except a central excavation, which does not extend to the edges of the disk. The choroid, however, is much thickened, especially in the posterior and outer portion of the fundus, where it reaches a thickness of at least 1 mm. In the anterior portion of the eye the choroid is normal in appearance, but becomes gradually thicker as it passes backwards, till it reaches its thickest point about half way between the equator and the nerve-entrance. Around the nerve-entrance the choroidal thickness gradually subsides again. This thickening of the choroid extends, therefore, over at least one-half of the fundus oculi, that is, as seen by the naked eye; microscopically, the entire choroid is slightly thickened, in some places reaching a thickness of 1 mm., in other places scarcely more than the ordinary thickness. The ciliary body is also somewhat thicker than normal, and curiously changed in shape, the ciliary processes being pushed backwards.

Thin sections were made, passing longitudinally through the optic nerve-entrance, choroid, and retina. The nerve appears to be healthy; the retina in this region is atrophic, but there are no marked changes, all the layers, even the ganglion layer and the cone layer, being perfectly preserved. The thickening of the choroid is due to an in-

terstitial deposit of fusiform and round nucleated cells. These cells are present throughout the stroma of the choroid, and are interspersed with occasional pigment cells, and traversed by the larger choroidal vessels. The pigment cells are fusiform or stellate, and are not generally present in large numbers, but vary in quantity in different parts of the choroid. The vitreous lamella of the choroid is everywhere present, and the pigment layer of the retina is intact, and generally attached to the choroid. The chorio-capillaris is also generally present. The spindle-cells are arranged in bundles, which interlace with one another. The round cells are collected in groups; they are large and delicate, having a large nucleus and distinct nucleolus. The appearances are those of sarcoma of the choroid. There is no trace of continuation of the sarcomatous tissue into the sclerotic, or into the nerve, or without the globe, the eyeball being perfectly smooth and without attachments.

The case is one of general choroidal sarcoma, without the formation of a distinct tumor. Inasmuch as the eyeball was enlarged and protruded at the time of birth, and there existed a congenital tumor of the antrum, it is not improbable that the new growth in the choroid also commenced during intra-uterine life.

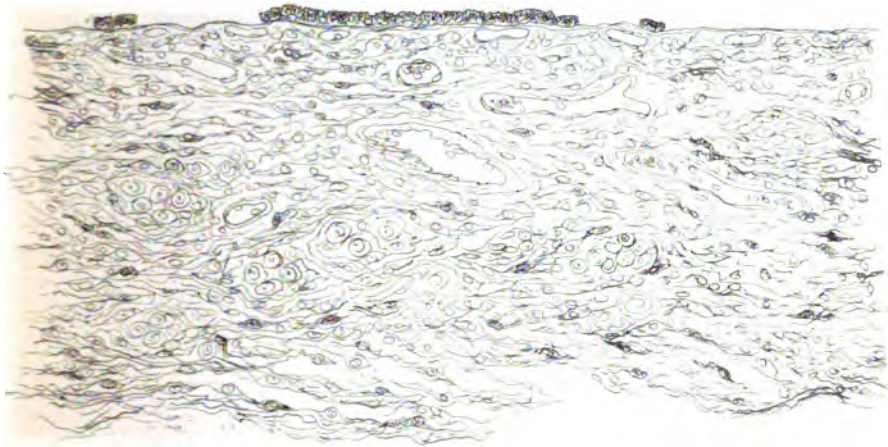


Fig. 1. Section of the Choroid. $\frac{300}{1}$.

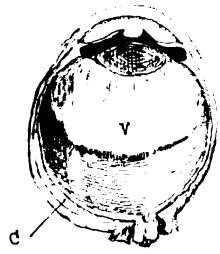


Fig 2 Section of the eyeball - natural size.
C. choroid - V. Vitreous -

H.C. Eno ſc.

A CASE OF CONSECUTIVE ENUCLEATION OF BOTH EYES FOR RECURRING GLIOMA. By C. R. AGNEW, M.D., and H. C. ENO, M.D.

A. R., thirteen months old, a very bright, healthy boy, had been observed not to fix his left eye accurately in early infancy. At the age of seven months his mother first saw a yellowish reflex from behind the pupil of the same eye. At the age of thirteen months he came under the observation of Dr. A., who advised immediate enucleation for glioma. At the latter date the cornea was beginning to grow hazy, and the vessels of the ciliary region to show marked hyperæmia. The eye was accordingly enucleated on May 5th, 1874, on the afternoon of the day upon which Dr. A. made the examination and diagnosis. It may be worth mentioning that this child was the first offspring of a married life of seventeen years, that its birth was by forceps, and that over the left brow remained a scar made by the imprint of one of the blades.

The enucleation was by the usual method, care being taken to get as much of the optic nerve as possible, and the recovery was quick, and without drawback of any kind.

On the 1st of November of the same year, or six months after the enucleation of the left eye, the mother observed that the right eye had a peculiar glazed look, having previously been well. On the 20th of November the eye became sightless; was examined by Dr. Agnew, who advised immediate enucleation for glioma of that eye.

In the case of the right eye, as there was no haziness of the cornea, a good view with the ophthalmoscope could be had after the pupil had been widely dilated by atropia. There was a general yellowish reflex from the interior of the eye, crossed by numerous new blood-vessels. There was one large tumor below and to the temporal side, numerous smaller ones scattered over the other portions of the field, and still other minute yellowish masses that were evidently free in what remained of the vitreous humor attached to a very much thinned portion of detached retina.

This second eye was enucleated on the 20th of November, 1874, the child being under ether. As much of the nerve as possible was removed with the eye, and after the enucleation, about a quarter of

an inch of the stump of the nerve was seized by forceps and cut off.

The most interesting part of the case follows, and is contributed by my friend, Dr. H. C. Eno.

On November 3, 1875, the father of the child writes: "He is apparently very well, and exceedingly happy and interesting."

EXAMINATION OF THE LEFT EYE.

The left eye was laid in Müller's fluid, and at the end of two weeks opened by a section passing nearly through the vertical meridian. Its antero-posterior measurement was found to be 23 mm., its transverse measurement 22 mm. The eyeball is normal in size and shape. The cornea is normal in appearance; the iris and lens are pushed tightly up against the posterior surface of the cornea, completely obliterating the anterior chamber. Nearly half of the vitreous chamber is occupied by a yellowish, gray mass of moderately firm consistency: the greater part of this mass lies in the posterior portion of the globe, apparently continuous with the optic nerve, and stretches forward to the posterior surface of the lens, where it again spreads out, sending processes to the inner surface of the ciliary bodies. The completely detached retina may be more or less distinctly seen passing in a wavy course through the centre of this mass from the nerve-entrance to the posterior pole of the lens. The remainder of the vitreous chamber is filled with a gray gelatinous substance (coagulated serum). The choroid and ciliary bodies are in place; the optic nerve is normal in appearance. (*Vide* Fig. 2.) Such are the appearances to the naked eye. The *microscopic examination* shows the new growth in the vitreous chamber to be made up entirely of small, roundish granular cells, and to be of the kind known as glioma of the retina. The tumor contains but few blood-vessels, and very little connective tissue. In the posterior portion of the globe, the retina is to be distinguished only as a band of connective tissue passing through the centre of the new growth, but in the anterior portion it may be more distinctly seen. Here the retina is folded upon itself at the ora serrata in such a manner that its inner surface lies tightly against the inner surface of the pars ciliaris retinæ; it runs along the inner surface of the ciliary body to the lens passing over its posterior surface to the posterior pole of the lens; here it meets the retinal fold from the opposite side, and is reflected directly backwards in the line of the axis of the eyeball. (*Vide* Fig. 1.) This portion of the retina is better preserved, and its layers

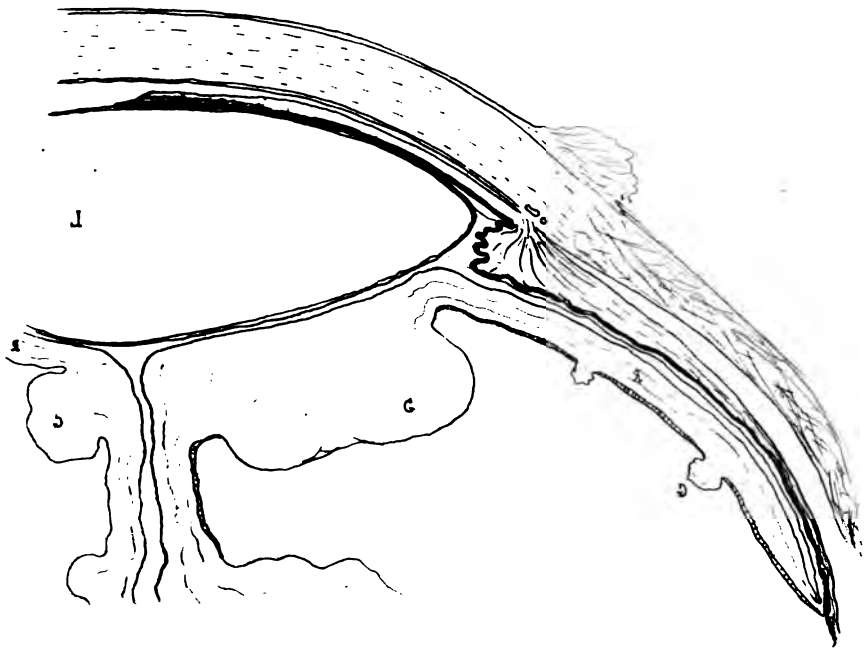


Fig. 1. Showing relations of Retina, Tumor te in the anterior portion of the Left Eye. L. Lens. R. Retina. G. Glioma.

Fig. 2 Section of right eye.

Fig. 3. Section of left eye.

Drawn & etched by H C Eno.

may all be easily recognized. And here the new growth may be distinctly seen to spring from the retina, arising from the external granular layer (layer of external granules), though in most places all the layers are affected; even where the retina is of normal thickness and the gross appearances of its layers are nearly normal, a high magnifying power shows that all parts are more or less infiltrated with glioma-cells. At the optic nerve-entrance, the new-growth presses against the lamina cribrosa, causing an excavation of the nerve which is filled by glioma-tissue. The lamina cribrosa is infiltrated with glioma-cells, as is the nerve itself, the cells lying both between and within the nerve-bundles: the number of cells becomes smaller at a greater distance from the eyeball, but they are easily found even in the remote portions of the nerve. There is nothing special to remark in respect to the iris, ciliary body or choroid, except some small secondary tumors on the surface of the latter. The sclerotic is everywhere healthy, and the glioma has not passed out of the eyeball except by the optic nerve. The relations of the retina and tumor in the anterior portion of this eyeball are unusual. The retina was probably detached at an early period of the disease, and the nodules of glioma on its outer surface were developed later.

There is nothing of special interest in the examination of the right eyeball. It was opened by a section through its vertical meridian, and the appearances are those represented in Fig. 3. The lens, iris, and choroid are in place, and the vitreous chamber is almost entirely filled with a mass of glioma, through which, in some places, the course of the retina may be indistinctly traced. In this eye the new growth has begun to show retrogressive changes, the tissue of the tumor being less consistent, and the cells having undergone fatty degeneration.

IRIDOTOMY BY VON WECKER'S METHOD. By Dr. J. Green, St. Louis.

I have found the new scissors of von Wecker a most admirable instrument for dividing the iris and pupillary false membranes in the absence of the lens. In one only of six iridotomies performed by the aid of this instrument during the past year, have I observed any trace of iritis, and in this case the operation was repeated with perfect success after an interval of five weeks.

In this case, a peripheric-linear extraction of cataract with lower section and iridectomy, a sudden attack of iritis, with occlusion of the pupil and increased tension of the globe, occurred two weeks after the extraction, all having progressed favorably up to this time. The iris was conspicuously bulged forward, and vision reduced to simple perception of light. A small iridectomy outward relieved the glaucomatous symptoms, but did not arrest the iritis, which resulted in a completely occluded and very eccentric pupil. Five months after the extraction the eye was free from irritation, but only quantitative perception of light remained. Iridotomy (double) was performed, in accordance with von Wecker's precept, making with two strokes of the scissors a V-shaped incision of the iris, with apex downward towards the cicatrix of the extraction wound. The tongue of iris thus formed retracted moderately, leaving a nearly central clear pupil, with vision sufficient to count fingers at two feet five minutes after the operation. The next day the eye was slightly painful, and was tender to the touch; the pupil was no longer clear, and in four days had become again closed by lymph. Five weeks later, after all symptoms of irritation had again subsided, a second iri dotomy was performed, in another position and in accordance with another plan.

In cases of occlusion of the pupil from iritis following cataract extraction with iridectomy, a simple inspection of the eye shows that in most cases the radiating fibres of the iris opposite to the excised portion are drawn tightly across from their ciliary attachment to the occluding cicatrix. They are thus in a state of great tension, which shows itself in some cases even by an oval outline of the cornea dependent upon the dragging of the contracting cicatrix through the radiat-

ing fibres of the iris upon the opposite side. This tension, if allowed to continue, must necessarily lead to grave consequences; it should, therefore, be a principal aim in operating to relieve it as completely as possible. This indication is most perfectly fulfilled by a bold linear incision of the iris, behind the centre of the cornea, in a direction at right angles to, and freely dividing all the stretched radiating fibres. The divided tissues may then be expected to retract sufficiently to open out the linear incision into a well-formed and central pupil, not likely to become closed by inflammation, etc.; if so closed, capable of being again opened by a repetition of the operation after all irritation has subsided.

The operation proved to be very easy of execution, and was entirely satisfactory in its effect. A horizontal linear incision, rather less than two lines in length, was made with von Wecker's scissors, dividing all the stretched fibres of the iris, together with all remains of capsule, false membrane, etc., resulting from the former attacks of inflammation; the incision gaped widely as the stretched tissues were divided by the scissors. The immediate effect of the operation was the formation of an oval pupil, nearly central, with a horizontal diameter of about a line and a half and a vertical diameter of somewhat less than a line. There was no bleeding of consequence, and the patient immediately counted fingers at five feet aided by a $+\frac{1}{4}$ lens. The eye recovered with scarcely any irritation, and two months after the operation the pupil was perfectly clear and of about the same dimensions and general form as at first. V. $=\frac{16}{LXIV}$.

In von Wecker's operation, as applied to aphakial eyes with occluded pupil, the avoidance of all dragging upon the tissue of the iris and upon its ciliary attachments recommends it as unquestionably and immensely superior to all the older plans for performing iridotomy—from iridectomy it has, in addition, the very important advantages of being easier of execution, and of leaving the eye in a much more favorable condition for a repetition of the operation, if not successful the first time. The one principle to be remembered in its application is to place the incision so as to divide, at right angles to their direction, such fibres of the iris as upon inspection are seen to be in a state of abnormal tension. By observing this rule I believe that much better results can often be attained by a single linear stroke of the scissors, than by the V-shaped incision recommended by von Wecker under the name of "iridotomie double."

NOTES ON THE EXAMINATION OF THE EYES OF A CRIMINAL EXECUTED BY HANGING. By Dr. J. Green, St. Louis.

In the Transactions of this Society, for 1866 and 1869, Dr. E. Dyer has reported the results of the examination of the eyes of five criminals executed by hanging. Of the ten eyes, one, the subject of cataract, suffered dislocation of the opaque lens downward and outward, rupturing a posterior synechia. Of the other nine eyes, six appeared to have sustained fracture of the lens, or rupture of the anterior capsule. In one of the five men the only lesion detected was the dislocation of the cataractous lens; in two others a positive or probable rupture of one lens or capsule was made out, while in the remaining two rupture of the capsule or fractures of the lens occurred in both eyes. Of three dogs, hanged experimentally, the first dog presented the same lesion in both eyes, the second dog in neither eye, and the third dog in one eye only. In six observations upon rabbits, killed by hanging, or by strangulation, the results were all negative.

In April, 1875, Patrick O'Shea was executed, by hanging, in St. Louis. The unusual drop of between seven and eight feet was given, and he died quickly and without struggle. His eyes were examined at intervals, beginning half an hour after the drop and ending at the expiration of a little over an hour. The ophthalmoscope and oblique illumination, using both ordinary artificial light and also direct sun-light which happened to be available, failed to show any trace of lesion either of the capsule or lens, in either eye. There were numerous small conjunctival ecchymoses, but the optic disk and retina, which were distinctly visible, failed to show any sign of vascular lesion.

CASTOR-OIL AS A MENSTRUUM FOR DISSOLVING ATROPIA FOR APPLICATION TO THE EYE. By Dr. J. Green, St. Louis.

Oil dropped into the eye appears to be of occasional service in recent abrasions and some other affections of the cornea, and in most of these cases atropia is also indicated. Having witnessed, about a year ago, the unsuccessful attempt of an apothecary to prepare a prescribed solution of sulphate of atropia in castor-oil, I suggested that the desired end might be attained by the substitution of the alkaloid for the salt, and upon trial, I arrived at a formula which may, perhaps, be thought worth reporting.

Dissolve one grain of atropia in two minims of strongest alcohol, and mix with fresh castor-oil, in any quantity, from half a drachm or less to an ounce, according to the strength desired. It is well to expose the stronger solutions for a short time to a gentle heat in a water bath, in order to drive off a part of the alcohol, which otherwise renders the application somewhat irritating to the surface of the eye.

In this way it is easy to prepare a clear and permanent solution of atropia in castor-oil, of any strength, from $\frac{1}{15}$ to $\frac{1}{480}$ or weaker. I have found it to be practically unirritating to the abraded or inflamed cornea, and I believe that it is occasionally to be preferred to the aqueous solution of the sulphate. It has seemed to be most useful in recent abrasions and painful phlyctenulæ and ulcers of the cornea, with or without iritis. In cases of photophobia, with excessive flow of tears, I have often applied it to the conjunctival surface of the everted upper lid, a plan which seems to ensure a longer contact of the remedy with the cornea than is the case when aqueous solutions are dropped into the conjunctival sac.

IMPROVEMENTS IN SPECTACLE FRAMES. By Henry D. Noyes, M.D., New York.

The following contrivances have been made by the optician, Mr. William Hunter, of New York, to meet certain special requirements in spectacle frames.

Reversible Frames.—For a person having the use of only one eye and who needs two glasses for different kinds of vision, it has been customary to make a frame whose bridge is on a line with the transverse diameter of the glasses, and which is reversed by turning it over in a plane parallel to the surface of the face. This is the kind of frame worn by patients who have had a cataract operation upon only one eye. The inconvenience attending this arrangement is that the bridge is not equally fitted to the use of the glass for distant and for near sight. If the nose be prominent, this may be exceedingly awkward. Moreover, in wearing cataract glasses, the person's comfort is promoted by having the frames light, and by having the arms turned over so as to hook behind the ears. The accomplishment of these objects has been secured by joining each arm to the body of the frame by two hinges which are close together. Each arm can then be made to sweep through a complete circle, and the glasses reversed by turning the frame in a plane parallel to the ground.

This does not reverse the bridge, which may be as concave as needed by the shape of the nose, and permits the arms to hook over the ears.

Another device which accomplishes the same object is to use a ball-and-socket joint for attaching the arms to the frame. This permits the arms to hook over the ears, but compels the employment of a horizontal bridge.

Double glasses.—For glasses of short focus a difficulty arises because of the great amount of aberration inseparable from their spherical curvature. If the patient look through the centre of the glass this error is small, but to do this renders fluent reading impossible. The eye cannot glance along the line and anticipate the words. I have been able to abate this annoyance by putting together two plano-convex lenses each of half the needful focus, with their convex sides toward each other. This well-known optical device has been found

satisfactory in several instances. The obvious need of making the spectacles as weightless as possible, has been well achieved. One frame is by a simple mechanism made to fasten to the other, and is easily separable from it, so as to permit cleaning. This suggestion of doubling the spectacle glasses permits other applications. For instance, if a cylindric glass is needed and near vision requires a glass of power different from that needed for distance—the glass for most frequent use may be made cylindric, and the one for occasional use may have a spherical curve, either plus or minus. The question is simply one of convenience and expense.

APPENDIX.

REMARKS OF DR. HENRY D. NOYES IN CONNECTION WITH DR. WEBSTER'S PAPER (see p. 284).

AMONG forty-three cases of sub-retinal effusion in private practice, I find one in which the fluid was spontaneously absorbed. In another case which I saw, in consultation with Dr. Simrock, and which I do not include, this happy result also took place.

The case of spontaneous cure is as follows:

Oct. 11, 1864.—Mr. C. M. J., an engraver, aged about 32, with myopia $\frac{1}{8}$, came to me, stating that, five days before, the sight of one eye suddenly became troubled, and in a few days he discovered that in certain parts of the field it was entirely destroyed. This occurred without pain, or without any uncommon straining of his eyes. He said that 16 years before this eye was struck by a bit of wood, and its sight was destroyed for a month, but it subsequently became entirely well.

I found that at present vision amounted only to perception of light, and could see in the fundus a transparent effusion lifting up the upper and outer part of the retina. I could not discover any rent in the membranes. The vitreous moderately hazy.

No serious treatment was advised, except to abstain from use of eyes, to wear dark-blue glasses, to use a mild diuretic.

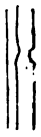
On the 15th, as he subsequently reported, a change occurred, by which his sight improved.

On the 18th he could, with -10, count fingers at 8 feet (V. $= \frac{8}{200}$). The vitreous was very hazy, and the retina had been restored to its place.

On the 20th, eye again examined, and found numerous opacities in vitreous, and could dimly see the optic nerve. In the upper and outer part of fundus the retina was traversed by

distinct horizontal folds, or ripples, as if, when reapplied to the surface, it had not been smoothly stretched. I could also see a small, nearly vertical line, which had the look of a laceration. In the vicinity were whitish spots and pigment granules, as if caused by an old choroiditis, such as might be accounted for by the blow received 16 years before.

Vision continued to improve, and in two months he could use his eye almost as well as before the sub-retinal effusion. But he had an annoying metamorphopsia. In looking at a row of vertical parallel lines, one or two of them had a nick, as in *figure*. It was not always precisely the same, but was never absent.



It will be noted that the improvement in sight came two weeks after the effusion occurred, and that the sac occupied the upper part of the globe, in which condition gravitation would favor a rupture of the retina, and diffusion of the fluid.

In two cases of sub-retinal effusion, I punctured the sac per scleram. The result was negative, or an aggravation of the condition.

NOTE.—It is to be regretted that, on account of the illness of Dr. Althof, we are unable to furnish the notes of eight cases of sub-retinal effusion, in all of which a spontaneous cure was observed. These cases, which derive additional interest from the fact, that many of them have been observed through a period of years, will be published in the next transactions of the Society.

RICHARD H. DERBY, *Secretary.*

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CONTENTS.

PAGE

MEMBERS OF THE SOCIETY 365
MINUTES OF THE TWELFTH ANNUAL MEETING 369
MINUTES OF THE THIRTEENTH ANNUAL MEETING 372
MINUTES OF THE FOURTEENTH ANNUAL MEETING 372

In Memoriam Dr. Althof 379
Notes on the Use of Nitrous Oxide as an Anæsthetic in Strabismus Operations. By DR. ARTHUR MATHEWSON, Brooklyn 380
Ophthalmic Contributions. By DR. GEORGE STRAWBRIDGE, Philadelphia .. 383
The Relations of Blepharitis Ciliaris to Ametropia. By DR. D. B. ST. JOHN ROOSA, New York 387
Lachrymal Conjunctivitis. By DR. J. S. PROUT, Brooklyn 397
Extirpation of the Ossified Choroid without Enucleation of the Eyeball. By DR. H. W. WILLIAMS, Boston 406
Cases Illustrating two rare Diseases of the Eyelids. By DR. C. S. BULL, New York 408
Syphilitic Gummata of the Conjunctiva. By DR. C. S. BULL, New York .. 415
A Case of Spontaneous cure of Subretinal Effusion. By DR. DAVID WEBSTER, New York 422
Remarks on Detached Retina. By DR. J. S. PROUT, Brooklyn 423
A Case of Multiple Rupture of the Circulus Iridis Minor, without other Injury to the Eyeball, with woodcut. By DR. J. J. B. VERMYNE, New Bedford, Mass 425
Tumor of the Conjunctiva, Simulating Cyst, with chromo-lithograph. By DR. RICHARD H. DERBY, New York 430
Cases of Sarcoma of Choroid and Retinitis Albuminurica. By DR. LEWIS S. DIXON, Worcester, Mass 432
Intraocular Circulation: Rhythmical Changes in the Venous Pulse of the Optic Disk. By DRS. O. F. WADSWORTH and J. J. PUTNAM, Boston. 435
Cases of Ophthalmic Disease in which Enforced Exposure of the Eyes to Light and Air was Salutary. By DR. C. R. AGNEW, New York 439
Photopsy from an Injured Eye, persisting Six Months after Enucleation. By DR. J. J. B. VERMYNE, New Bedford, Mass 449
A Practical and Rapid Method, with an Instrument, for the Diagnosis of the Refraction, with woodcuts. By DR. WM. THOMSON, Philadelphia 455

PAGE

An Examination under Atropine of the Refractive State of Eyes with Normal Vision ($\frac{20}{20}$), and which have never been Affected with Asthenopia or Inflammation. By DR. D. B. ST. JOHN ROOSA, New York..... 463

On Some Improvements in Instruments and Appliances for Diagnosis, with woodcuts. By DR. JOHN GREEN, St. Louis..... 467

A New Modification of the Ophthalmoscope, with woodcuts. By DR. E. G. LORING, New York..... 489

The Ætiology of Retinitis Pigmentosa, with cases. By DR. DAVID WEBSTER, New York..... 495

Enucleation of an Eyeball, followed by Immediate and Marked Reduction of the amount of Urine passed in a Case of Diabetes Insipidus. By DR. GEO. T. STEVENS, Albany, N. Y..... 506

A Curved Knife for certain Forms of Stricture of the Inferior Lachrymal Canaliculus, with woodcut. By DR. C. R. AGNEW, New York..... 510

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DR. E. WILLIAMS.....Cincinnati, O.
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DR. E. REYNOLDS.....Boston, Mass.
DR. C. SCHWEIGGER.....Prussia.

Total.....5

Whole Number 78

MINUTES OF THE PROCEEDINGS.

TWELFTH ANNUAL MEETING.

NEW YORK, *September 11th*, 1876.

THE meeting was called to order by the President, Dr. C. R. AGNEW, at 10.50 A.M. The minutes of the last meeting were read and approved. The Society then went into executive session. The chair appointed a committee on the election of new members, to consist of Drs. Althof, Noyes, Roosa, Bull, and Dyer.

The Report of the Treasurer was then read and referred to an auditing committee, Drs. Carmalt and Mathewson. This committee reported the Treasurer's account correct, and it was accepted.

The Treasurer moved that the assessment for 1876–7 be omitted. This motion was seconded and carried.

The Treasurer moved that the names of members in arrears to the Society for three years be stricken from the list, except in case of those absent from the country, and three months after notification of this motion had been served upon such members. This motion was seconded and carried.

Dr. Dyer and the Secretary, who were appointed a committee to prepare a minute on the death of Dr. John Jeffries, submitted the following:

Dr. John Jeffries, one of the first elected Honorary Members of the American Ophthalmological Society, died in Boston, July 16, 1876, n the eighty-first year of his age. Dr. Jeffries was the son of Dr. John ffries, a distinguished surgeon of Boston. He went to Harvard College, nd was graduated in the class of 1815, and in 1819 he received the egree of Doctor of Medicine. He served the city of Boston on the

Board of Consulting Physicians for several years, during which he earnestly strove for the establishment of a properly organized Board of Health. Dr. Jeffries was one of the founders of the Massachusetts Charitable Eye and Ear Infirmary, and for eighteen years was one of its surgeons. Besides his special work in ophthalmic surgery, he had a large general practice. He practised in Boston for fifty-six years, and died universally respected and beloved as man and physician.

The resignations of Dr. F. J. Bumstead and Dr. E. Curtis were presented and accepted.

Dr. Roosa moved that a committee of five be appointed to act in conjunction with the committee of the International Congress. This motion was seconded and carried, and the chair appointed Drs. Williams (Boston), Dyer, Green, Thomson, and Rider.

The Committee on Membership reported favorably on the names of—

DR. WM. RANKIN, of Newark, N. J.
DR. A. PER LEE PEASE, of Massillon, Ohio.
DR. PETER A. CALLAN, of New York, N. Y.

These gentlemen were unanimously elected.

Dr. Roosa moved that a committee be appointed, to consist of the President and Secretary of the Society and of five other members, to arrange the place of meeting for next year. This motion was seconded and carried. The chair appointed Drs. J. F. Noyes, J. Green, E. Williams, E. Dyer, and H. W. Williams.

The Committee on Membership was charged with the nomination of officers for the ensuing year. The committee reported the following names:

For President—DR. C. R. AGNEW, New York.
Vice-President—DR. G. HAY, Boston.
Recording Secretary and Treasurer—DR. RICHARD H. DERBY, New York.
Corresponding Secretary—DR. H. ALTHOF, New York.
Publishing Committee—DR. H. D. NOYES, New York. DR. E. G. LORING, "

Dr. Agnew begged leave to withdraw his name; but this was not allowed. These names were balloted on, and the gentlemen were unanimously elected.

Dr. Green moved a suspension of the By-Laws in reference to the time of the next annual meeting. This motion was seconded and carried.

Dr. Green moved that the time as well as the place of meeting be submitted to the same committee. Seconded and carried.

Adjourned.

RICHARD H. DERBY, *Secretary.*

The following members were present at the meeting of September, 1876:

DR. C. R. AGNEW.....New York.
DR. H. ALTHOF.....New York.
DR. C. S. BULL.....New York.
DR. W. H. CARMALT.....New Haven, Conn.
DR. D. COGGIN.....Salem, Mass.
DR. RICHARD H. DERBY.....New York.
DR. LEWIS S. DIXON.....Worcester, Mass.
DR. E. DYER.....Pittsburgh, Pa.
DR. C. S. FENNER.....Louisville, Ky.
DR. JOHN GREEN.....St. Louis, Mo.
DR. EMIL GRUENING.....New York.
DR. E. L. HOLMES.....Chicago, Ill.
DR. SAMUEL J. JONES.....Chicago, Ill.
DR. ARTHUR MATHEWSON.....Brooklyn, N. Y.
DR. S. F. MCFARLAND.....Oxford, N. Y.
DR. R. J. MCKAY.....New York.
DR. H. G. MILLER.....Providence, R. I.
DR. H. D. NOYES.....New York.
DR. J. F. NOYES.....Detroit, Mich.
DR. OREN D. POMEROY.....New York.
DR. J. S. PROUT.....Brooklyn, N. Y.
DR. WM. RANKIN.....Newark, N. J.
DR. D. B. ST. JOHN ROOSA.....New York.
DR. J. J. B. VERMYNE.....New Bedford, Mass.
DR. D. WEBSTER.....New York.
DR. H. W. WILLIAMS.....Boston, Mass.

THIRTEENTH ANNUAL MEETING.

NIAGARA FALLS, *July 26th*, 1877.

The Society met at the Cataract House, at 10 A.M. In the absence of the President, Dr. H. D. Noyes was appointed chairman. Six members were present—Drs. H. Derby, R. H. Derby, J. Green, H. D. Noyes, J. F. Noyes, and G. T. Stevens. There being no quorum, the meeting was adjourned.

RICHARD H. DERBY, *Secretary*.

FOURTEENTH ANNUAL MEETING.

NEWPORT, *July 25th*, 1878.

The Society held its Fourteenth Annual Meeting at the Aquidneck House, at 10.30 A.M. The President, Dr. Agnew, in the chair. The minutes of the last two meetings were read and approved. Upon the motion of Dr. H. W. Williams, Drs. E. G. Loring and C. S. Bull were appointed a committee to prepare a minute on the death of Drs. Herman Althof and George Wilkes.

The following gentlemen were appointed by the chair a Committee on Membership: Drs. H. W. Williams, J. Green, W. Thomson, H. G. Miller, and Arthur Mathewson.

The Report of the Treasurer was read, and referred to an Auditing Committee, consisting of Drs. Strawbridge and Stevens.

The Committee on Membership was charged with the nomination of officers for the following year.

The President appointed as a Committee on Bulletin, Drs. Merrill, Vermyne, and Wadsworth.

The President asked that his own name might not be considered as a candidate for re-election to office.

Dr. H. W. Williams proposed this amendment to the By-Laws,—after the first clause of By-Laws, and to take the place of the second paragraph :

"All nominations shall be made in open meeting by two members of the Society, and shall be referred to the Committee on Membership, who may report on each name as they shall think proper; such report to be made at the next annual meeting following that at which the nomination is made. But the proposers of any name may, after the report of this committee has been received, bring such name before the Society."

This motion was seconded, and, in accordance with the By-Laws, was ordered to lie over until the next session of the Society.

The Committee on Bulletin reported, and the President called for a paper by

1. Dr. Mathewson: "Nitrous Oxide as an Anæsthetic in Strabismus Operations."

2. Dr. Strawbridge: "Ophthalmic Contributions; a Case of Glioma; Cyst of the Iris; a Congenital Malformation of Conjunctiva resembling Pterygium; remarks on Secondary Cataract Operations, with presentation of a new Instrument."

3. Dr. Roosa presented by title a paper on "The Relations of Blepharitis Ciliaris to Ametropia." Also

4. "A Case of Anæmia of the Retina, apparently Caused by Cinchona-Poisoning."

5. Dr. Prout: "Lachrymal Conjunctivitis."

6. Dr. H. W. Williams: "The Abuse of Mydriatics."

7. "A Case of Excision of Ossified Choroid without Enucleation."

8. Dr. Bull: "Two Cases, illustrating rare Diseases of the Eyelids."

9. Dr. Webster: "A Case of Spontaneous Cure of Subretinal Effusion." Some discussion ensued upon the reading of this paper, and the impression of several speakers was that, in the treatment of subretinal effusion by the recumbent atti-

tude, it was the rest that accomplished the relief, and not the supine position.

The committee, appointed to audit the Treasurer's Reports for 1877–1878, found them correct, and they were accepted.

Adjourned at 2.30 P.M.

July 25th.

Evening Session at 7.45. In the absence of the President, Dr. Carmalt in the chair. The minutes of the morning meeting were read and approved.

10. Dr. Vermyne: "A Case of Rupture of the Sphincter Pupillæ."

11. Dr. R. H. Derby: "A Case of Tumor of the Conjunctiva, with Drawing, Simulating Cyst."

12. Dr. Dixon: "Cases of Retinitis Albuminurica; Embolism of Central Artery of Retina and Sarcoma of both Eyes."

13. Dr. Bull: "A Case of Syphilitic Gumma of the Conjunctiva."

14. Dr. Wadsworth: "Intraocular Circulation."

The Society went into executive session. The following officers were elected for the ensuing year:

President—DR. H. D. NOYES, New York.
Vice-President—DR. W. F. NORRIS, Philadelphia.
Recording Secretary and Treasurer—DR. RICHARD H. DERBY, New York.
Corresponding Secretary—DR. J. S. PROUT, Brooklyn.
Committee on Publication—DR. E. G. LORING, DR. D. B. ST. JOHN ROOSA, } New York.

The resignations of Dr. C. M. Allin and Dr. H. C. Newton were presented, and accepted.

Dr. Roosa moved that, as the sense of this Society, resi-

dence in Canada was not a disqualification for membership. This motion was seconded, and carried.

The following gentlemen were then elected members of the Society:

DR. E. T. ELY, New York.
DR. F. B. LORING, Washington.
DR. F. W. ABBOTT, Buffalo.
DR. W. S. DENNETT, Boston.
DR. J. A. SPALDING, Portland.
DR. W. S. LITTLE, Philadelphia.
DR. W. V. MARMION, Washington.
DR. H. CULBERTSON, Zanesville, O.
DR. LUCIEN HOWE, Buffalo.
DR. F. BULLER, Montreal.

The motion to amend the By-Laws, made by Dr. Williams, was now considered. Dr. Green moved that this clause be added to the amendment offered by Dr. Williams:

"The Secretary shall, soon after each annual meeting, send to each member of the Society a list of the names of all candidates proposed for membership, together with the names of proposers and of the members of the Committee on Membership."

This amendment, together with that of Dr. Williams', was seconded and carried.

Dr. Loring offered the following resolution:

"That all papers shall be referred to the Secretary and Publishing Committee, who shall have the power to select such papers as may seem worthy in their estimation of being read before the Society. That such papers shall be so referred one month before the meeting. That the Secretary shall be directed to prepare a bulletin of such papers, which shall be forwarded to each member of the Society as soon as the decision of the Committee is rendered."

This resolution was seconded.

The report of the Committee, recommending Newport as ıe place for the next annual meeting, was accepted.

Adjourned.

Morning Session at 9.45. The President, Dr. Agnew, in the chair. The minutes of the last session were read, and approved.

15. Dr. Vermyne: "Photopsy from an Injured Eye, persisting Six Months after Enucleation."

16. Dr. E. G. Loring read by title a paper on "Strabismus."

17. "Disappearance of Lenticular Opacities."

18. "Visual Purple."

19. Dr. Roosa: "Examination under Atropia of the Refractive State of Eyes with Normal Vision and which have never been affected with Asthenopia or Inflammation."

20. Dr. Thomson: "A New Method for the Rapid Determination of the Refraction without Glasses, with Demonstration of an Instrument."

21. Dr. J. Green: "On Some Improvement in Instruments for Diagnosis: 1st. Tests for Astigmatism. 2d. A Modification of Dr. Loring's Ophthalmoscope. 3d. Remarks on the Test Set of Glasses. 4th. Tests for Binocular Vision. The Chromatic Aberration of the Eye."

22. Dr. Stevens: "Enucleation of an Eyeball, followed by immediate and marked Reduction of the Amount of Urine passed in a Case of Diabetes Insipidus." Dr. Agnew suggested that, as ether had been given before the operation, this might have been the cause of the suppression of the urine. No microscopical examination of the urine had been made, the author stated, in reply to questions from the President.

23. Dr. Webster: "The Consanguinity of Parentage and Heredity in Retinitis Pigmentosa."

24. Dr. Jeffries: "The Relative Frequency of Color-Blindness in Males and Females."

Dr. Jeffries also explained the practical use of Holmgren's Method of Testing for Color-Blindness.

25. Dr. Agnew: "A New Instrument for Operation on the Lachrymal Passages."

26. "Cases of Ophthalmic Disease, in which enforced Exposure of the Eyes to the Light and Air was Salutary."

27. Dr. E. G. Loring: "A new Modification of the Ophthalmoscope," and "An Artificial Eye (Phantom) representing the Combined System."

All the papers read were referred to the Publishing Committee, with power.

The following minute of the death of Dr. Geo. Wilkes was offered:

DR. GEORGE WILKES, an Honorary Member of the American Ophthalmological Society, died November 30, 1876, at the age of 76 years. DR. WILKES was appointed a Surgeon of the New York Eye and Ear Infirmary in 1832, and held this office until 1852, when he resigned. At that date he became one of the Consulting Surgeons of the Infirmary. For many years he was identified with ophthalmic practice in his native city. DR. WILKES was well known as a general practitioner.

The Committee on Membership recommended that the Society should limit its number of members to eighty. This amendment to the By-Laws was seconded, and ordered to lie over to the next meeting.

Dr. H. W. Williams moved that, while the Committee on Nominations accepted the suggestion of DR. Agnew, he should not again be considered a candidate for office, the Society express their sense of the dignity with which Dr. Agnew had filled the position of President. This motion was seconded, and carried. Adjourned.

RICHARD H. DERBY,
Recording Secretary.

The following members were present at the meeting of July, 1878:

DR. C. R. AGNEW.....New York.
DR. E. W. BARTLETT.....Milwaukee, Wis.
DR. C. S. BULL.....New York.
DR. W. H. CARMALT.....New Haven.
DR. RICHARD H. DERBY.....New York.
DR. L. S. DIXON.....Worcester, Mass.
DR. JOHN GREEN.....St. Louis, Mo.
DR. B. JOY JEFFRIES.....Boston.
DR. E. G. LORING.....New York.
DR. F. B. LORING.....Washington, D. C.

DR. A. MATHEWSON.....Brooklyn, N. Y.
DR. C. S. MERRILL.....Albany, N. Y.
DR. H. G. MILLER.....Providence, R. I.
DR. O. D. POMEROY.....New York.
DR. J. S. PROUT.....Brooklyn, N. Y.
DR. D. B. ST. JOHN ROOSA.....New York.
DR. F. P. SPRAGUE.....Boston.
DR. GEORGE T. STEVENS.....Albany.
DR. GEORGE STRAWBRIDGE.....Philadelphia.
DR. WILLIAM THOMSON.....Philadelphia.
DR. J. J. B. VERMYNE.....New Bedford, Mass.
DR. O. F. WADSWORTH.....Boston.
DR. D. WEBSTER.....New York.
DR. H. W. WILLIAMS.....Boston.

DR. ALTHOF.

DR. ALTHOF, one of the founders of the AMERICAN OPHTHALMOLOGICAL SOCIETY, died January 15, 1877. His portrait has been placed among the archives of the Society, as a token of the respect and affection of his fellow-members.

The following brief sketch of his life will be interesting to those who are unacquainted with his earlier career:

HERMAN ALTHOF was born in the province of Lippe-Detmold, Germany, in 1835. He came first to this country in 1845, but returned to Germany to complete his academic education and to study his profession. He passed his examination in Berlin, and took his doctorate in 1858. In his preparatory medical studies he spent a year at Paris. As soon as he passed his examination in Germany he returned to this country, arriving in New York in 1858. After an interval of two years he again went back to Germany, spending several months in microscopical work with Heinrich Müller, afterward becoming one of Graefe's assistants in Berlin.

On DR. ALTHOF'S return to New York he became connected with the German Dispensary, and shortly after one of the Surgeons to the German Hospital. In 1862 he became connected with the New York Eye and Ear Infirmary, as Curator and Microscopist; in 1864 full Surgeon; and again, in 1875, Executive Surgeon. He was one of the founders of the New York Ophthalmological Society, and twice its President.

Through a modesty which may be fairly considered excessive, he published but very little; but his fidelity to duty, his learning and skill, his varied accomplishments, his utter unselfishness, and his manly love of truth in every phase of his existence, impressed everybody with whom he came in contact, and exerted an influence over the Society of which he was an honored member, as beneficial as it was forcible.

NOTES ON THE USE OF NITROUS OXIDE AS AN ANÆSTHETIC IN STRABISMUS OPERATIONS. By DR. ARTHUR MATHEWSON, Brooklyn.

THE use of nitrous oxide as an anæsthetic for other operations than those of dentistry has been the subject of frequent discussion in medical societies and journals, and especially of late, since the apparatus for its administration has been so much improved; but, so far as I am aware, no cases in which it has been employed in ophthalmic surgery have been *reported*, with the exception of one referred to by Dr. Jeffries, in a paper read before this Society, in 1871, in which he employed it for doing Passavant's operation. He commends it highly, his patient suffering none of the disagreeable consequences which had been caused by previous administration of ether.

My friends, Drs. Giberson and Rushmore, of Brooklyn, had each recently used it in cases of amputation, where the patients were so feeble that they hardly dared to administer the other anæsthetics, and had found that, after being kept under its influence for from twenty-five to thirty minutes, they recovered consciousness almost immediately, had no trouble from vomiting, and were left in a very satisfactory condition.

Learning from these cases within my own personal knowledge, and from others of which I had read, how easily and with what apparent safety the full anæsthetic effect of nitrous oxide could be kept up for a period more than long enough for any ordinary strabismus operation, and how speedily the effect passed away, it occurred to me that this agent would offer special advantages as an anæsthetic in strabotomy over chloroform or ether. As we all know, the effect of these latter is often slow in passing away, and it may be a long time before the patient is in a condition to enable us to satisfactorily test the effect of the operation, so as to decide whether it is best to operate on the other eye, to dissect more freely, or to use sutures to increase or diminish the effect of the dissection—a most desirable thing, as every operator must concede. The sense of suffocation caused by ether, too, with the attendant resistance, struggling, and other dis-

agreeable symptoms, are not to be too lightly thought of, especially in case of delicate, nervous children with excitable parents.

These were the *à priori* considerations which led me to think favorably of nitrous oxide as an anæsthetic in strabotomy; and the following cases show my experience with it:

CASE I.—Miss A. Mc., æt. 23, the subject of convergent strabismus, had been operated on for its relief by another surgeon previous to coming under my care, and by myself on January 2, 1878. There was still a slight degree of convergence remaining; and to correct this she was put under the influence of nitrous oxide, February 12, 1878, by Dr. George F. Brush, an expert in its use, and tenotomy of the internal rectus of the right eye performed. The patient was fully anæsthetized in two minutes, and the operation finished in two minutes more—the matted condition of the tissues resulting from previous operations rendering it difficult to complete the dissection more quickly. The inhalation of the nitrous oxide was kept up during the whole time, thus occupying four minutes. The unconsciousness passed off at once, so that the effect of the operation could be fully tested, and within five minutes from the time she began the inhalation the patient rose from the operating-chair and was ready to walk home without assistance. She felt no pain during the operation, and there were no unpleasant after-effects, as on previous occasions, when the ether had made her sick for two or three days. The ether had also produced very disagreeable sensations of suffocation; while the sensations caused by the nitrous oxide were, according to her statement, rather agreeable than otherwise.

CASE II.—Miss M. G., æt. 22, was put under the influence of nitrous oxide for operation for correction of convergent strabismus, by Dr. Brush, at his office, February 16, 1878. Drs. Giberson and Hesse assisted me, and the former took accurate note of the time. She was fully anæsthetized in one minute; tenotomy of the left internal rectus was done in one minute more; and forty-five seconds after removal of inhaling apparatus (which had only covered the mouth, not the nose, during a part of the time) she had completely recovered consciousness, so that the effect of the operation could be tested. There was no vomiting or other unpleasant after-effects.

CASE III.—Miss A. C., æt. 8—convergent strabismus; May 30, 1878—was completely anæsthetized by nitrous oxide, administered by Dr. Brush, in one and a half minutes; tenotomy of internus of O. D. performed in one and a half minutes. Recovery of conscious-

ness almost instantaneous, so that effect of operation could be tested. This patient had dined just previous to the operation, and there was some vomiting afterward. A few weeks later tenotomy of the left internus was performed. The nitrous oxide was given on this occasion more slowly, *i. e.*, mixed with more air, and the patient was anæsthetized in three minutes. The operation, including introduction of suture, occupied one minute and fifty seconds. There was some vomiting afterward.

CASE IV.—James D., æt. 22—convergent strabismus—operated on May 28, 1878. Anæsthetized in two minutes. Tenotomy of right internus in one and a half minutes; interval of one and a half minutes; tenotomy of left internus one minute; no vomiting or other unpleasant after-effects.

CASE V.—E. C., boy of 6 years—strabismus convergens. Anæsthesia obtained in one and a half minutes; tenotomy of both interni occupied three minutes. Consciousness restored at once, and effect of operation tested after a minute or two. No unpleasant after-effects except a very little vomiting.

In all these cases the patient was seated in a dentist's operating-chair, tipped back as far as possible, and the gas drawn from the apparatus of Johnston Bros. (1260 Broadway, New York) for the use of the liquid nitrous oxide. This has an inhaler fitted with a valve, so that atmospheric air can easily be admitted, and a cup-shaped cover to go over mouth and nose. Johnston Bros. make also a very convenient portable apparatus.

The patient in each case went quietly under the influence of the anæsthetic without any of the suffocating sensations caused by ether, and, with the exception of the vomiting in two of the cases, there were no unpleasant after-effects.

In some of the cases a blue and livid color of the face came on, as it will sometimes during the administration of ether; but this passed off at once on admission of air, and had no disagreeable consequences.

It was noticed that while this lividity of the face continued there was scarcely any bleeding from the dissection, and that the blood was very dark; but on admission of air the blood became bright at once and flowed freely.

Full muscular relaxation did not accompany anæsthesia in all these cases; but this was not an inconvenience, as it might prove in cataract and other operations.

The minimum and maximum quantities of gas consumed in these cases were seven and twenty gallons, at a maximum cost of one dollar.

Previous to the date of these cases my colleague, Dr. Rushmore, had employed nitrous oxide in a strabismus operation at the Brooklyn Eye and Ear Hospital, with very satisfactory results.

OPHTHALMIC CONTRIBUTIONS. By GEORGE STRAWBRIDGE, M.D., of Philadelphia.

I. TUMOR OF THE OPTIC NERVE—ITS REMOVAL WITHOUT ENUCLEATION OF THE EYEBALL.

THE case occurred in a woman æt. 24, housekeeper by occupation, married. Both eyeballs were prominent from birth. For a number of years the woman had suffered from neuralgic attacks (right hemicrania) and slow loss of vision of right eye. Four years ago the eye became entirely blind. One year later, after a difficult confinement, a marked increase of exophthalmos of the right eye was observed. This has continued to time of operation.

Status præsens.—Right eyeball has an exophthalmos of 12 mm., and is pushed upward and toward the nasal side of the orbit by the tumor, which can be felt by the finger pressed between the inferior and external recti-muscular interspace. Motions of the eyeball are moderately good; tension not altered; some conjunctival injection; entire loss of vision.

Ophthalmoscopic Examination.—Refraction hypermetropic; media entirely clear; papilla, white, outline somewhat undefined, as if neuritis had previously existed

Diagnosis.—Atrophy of optic nerve after neuritis, caused probably by an optic nerve tumor.

Method of Operation.—The outer lid commissure was divided to increase the available room. The inferior and external recti-muscles were then divided at their eyeball attachment, and the interspace cleared sufficiently to allow a finger entrance. The tumor could be distinctly felt, and to a certain extent could be separated from the surrounding tissue by the finger; the optic nerve could be felt

passing into the growth, and the tumor projected far down the orbit. As the finger was laid on the growth, pulsation could be distinctly felt, and the eyeball, which rested on the finger, was seen to move synchronously with the arterial pulsation. A curved pair of scissors divided the optic nerve close behind the eyeball and in front of the tumor. The eyeball was turned upward and held resting on the supra-orbital ridge. This allowed closer examination of the mass below; pulsation could be distinctly noticed, and a wire ligature was placed around the lower end of the growth, and then with a needle a puncture was made to determine its character. The removal of growth was then completed with the scissors without considerable hemorrhage. An effort was made to preserve the eyeball, which still had four muscular attachments intact as well as considerable conjunctival and surrounding tissue.

At this stage of the operation the loose tissues of the orbit had become œdematous and were trimmed to some extent, to allow of replacement of the eyeball. This was finally accomplished and the lids closed by stitches to hold it in position, a pressure bandage being also used.

Twenty-four hours after the operation, cornea was slightly punctated. Day by day, the cornea became more cloudy, and ruptured on the tenth day, with escape of transparent vitreous and lens. The final result was an atrophied eyeball, which is still retained, and in which an artificial eye can be worn.

Examination of the tumor shows that the optic nerve, close behind the eyeball, is lost in a growth, having a long diameter of 38 mm. and a thickness of 20 mm. The tumor originally was of a soft consistence, and has been hardened by the Müller solution. The optic nerve is quickly lost after its entrance into the growth, which is surrounded by the nerve-sheath.

Microscopic Examination.—The outer layers consist of elongated, spindle-shaped cells, mingled with elastic fibres (the hypertrophied nerve-sheath). The central mass consists chiefly of short spindle cells with large, round cells in groups. The amount of granular matter is small. The tumor would be classified as a glioma.

Quite lately I have seen the patient. Her remaining eyeball is almost devoid of vision; optic papilla shows atrophy after neuritis; no increase in prominence of eyeball. Patient has cerebral symptoms indicating central lesion.

Goldzieher, in an excellent article on Tumors of the Optic Nerve (Graefe, Archive, 19th Year, 3d Part, 1873), has collected nine cases

of optic nerve tumor as the total reported up to that time; he summarizes these cases as follows:

"The growths are closely related to connective-tissue neoplasms. The greater number are fibroma, and have the peculiarity that the nerve fibres partly are distributed through the entire tumor and partly in a compact mass envelops it. The tumors have their origin in the inner nerve-sheath at some one point, and not in its entire extent. Thus it often happens that these tumors are excentric to the nerve in their position. A smaller number of these tumors belong to the class of sarcoma and glioma; in these cases the nerve is surrounded by the growth. The retina and papilla as yet have been so little examined that no conclusions can be drawn as regards changes taking place in them."

II.—CYST OF THE IRIS.

In the Philadelphia *Medical Times*, of February 15, 1873, I published an article on "Cysts of the Iris." At that time there was a total of thirty-four published cases; since then a number of others have been added to the list.

The case that I wish now to notice occurred in the right eye of a boy æt. 14. The cyst had a length of 7 mm. and a width of 6 mm., and projected far over into the pupil, leaving only a small slit open. In color it was opaque white, with brown fibres of iris tissue passing over it in streaks. A small cicatrix was seen at the lower corneal edge, as if resulting from a wound, although no such history existed. Some ciliary congestion around inner corneal margin.

The cyst occupied the nasal half of the iris, and was of one year's growth.

Tension of eyeball normal. No amount of pain had existed. V = $\frac{20}{100}$.

Operation for its Removal.—The cornea was punctured with a Graefe knife below the cyst; the knife was then withdrawn, and a pair of scissors completed the opening by a succession of cuts, gradually working around the growth, so as to extract it in its entirety. For this reason the Graefe knife had to be laid aside, as the counter-puncture could not be made without puncturing the tumor. About one-half of the cornea was divided; a wire loop was then introduced and the cyst extracted. The eyeball rapidly healed, and vision has increased to $\frac{20}{70}$.

Microscopic Examination.—The outer wall consists of the stroma and muscular coatings of the iris, the uvea being absent. This was

lined with a layer of squamous epithelial cells, swollen, and in an advanced stage of fatty degeneration. These cells are free from each other, and are surrounded by granular matter, fat, and cholesterine crystals. It might therefore be classed with certain sebaceous tumors, so-called, in which the common cystoid cell is wanting, and one that might be cited in proof of Paget's theory—that *they are sometimes a new formation.* Graefe also insists that in some instances the cyst must be regarded as a new formation, and supports his opinion by a case of dermoid cyst, which contained epidermis and hair, with amorphous fat and cholesterine.

III.—CONGENITAL MALFORMATION OF CONJUNCTIVA RESEMBLING PTERYGIUM EXTERNUM.

The case occurred in an infant æt. 6 weeks. The corneæ were covered to fully one-half their surface with a growth of conjunctiva extending from the outer lid commissure—a cloudy zone extended still further over the cornea—beyond the conjunctiva. The lid interspace was fully developed, no connecting bands existing between the growth and the palpebral conjunctiva. Outer canthi normal. Eyeball and appendages in other respects were normal, and child evidently had considerable sight. No cause can be assigned for this condition. Treatment delayed on account of age of patient.

THE RELATIONS OF BLEPHARITIS CILIARIS TO AMETROPIA. By D. B. St. John Roosa, M.D.

At the Fifth International Ophthalmological Congress, held in New York in 1876, I read a paper on the above subject, and stated the following conclusions, as those which seemed to me to be deduced from my cases :

" 1. Ametropia seems to be the condition of most eyes affected with blepharitis ciliaris.

2. When the blepharitis is associated with errors of refraction, the cure of the edge of the lids is very much facilitated by, and sometimes depends upon, correction of the ametropia.

3. Paralysis of the accommodation by the use of atropia will usually, with no other treatment, very much relieve the blepharitis that is associated with ametropia.

4. Patients suffering from blepharitis that is associated with ametropia will often ignore any other affection of the eyes than that of the edge of the lids, and deny that they suffer from asthenopia or conjunctivitis, complaining only of the discomfort and disfigurement produced by the disease ; and this when the error of refraction is so marked that we would naturally expect quite serious consequences from its non-correction.

5. The form of blepharitis to which my statistics refer is not a mere irritation of the edge of the lids, such as often accompanies a catarrhal conjunctivitis, but a true hyper-secretion of the tarsal glands and hair-follicles, with the formation of crusts, and sometimes the development of ulceration.

6. Hypermetropia is the error of refraction most frequently associated with blepharitis ciliaris.

I have here restated them, because one writer * has not, I think, kept them sufficiently in view in his paper intended as an answer to mine, on the relation of ametropia to blepharitis ciliaris. Since reading my own paper I have continued my investigations in this and a cognate subject, and I now beg the indulgence of the Society for a

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* F. C. Hotz, Chicago Medical Journal and Examiner, April, 1878.

few additional statistics, as well as for a brief reply to some of the objections that have been made to my conclusions.

Two hundred and one cases of blepharitis ciliaris have been observed at the Manhattan Eye and Ear Hospital since the reading of my paper.

In spite of my efforts to secure an examination of the refractive state of the eyes thus affected, in only forty-eight of these was it noted. In these the refractive state is recorded as follows:

Hypermetropia	34
Myopia	1
Astigmatism	7
Emmetropia	6

Hypermetropia.

Case 1. (Under atropia), + $\frac{1}{30}$.
" 2. By ophthalmoscope.
" 3. + $\frac{1}{30}$.
" 4. Hypermetropia cum Presbyopia.
" 5. By ophthalmoscope, $\frac{1}{16}$.
" 6. " "
" 7. " " R.E., $\frac{1}{40}$; L.E., $\frac{1}{24}$.
" 8. (Under atropia), R.E., $\frac{1}{20}$; L., $\frac{1}{24}$.
" 9. " R.E., $\frac{1}{36}$; L.E., E.
" 10. Hypermetropia.
" 11. "
" 12. " $\frac{1}{40}$.
" 13. "
" 14. Atropia, R., $\frac{1}{24}$; L., $\frac{1}{30}$.
" 15. H., $\frac{1}{60}$.
" 16. Ophthalmoscope.
" 17. R., $\frac{1}{60}$; L., $\frac{1}{30}$.
" 18. Atropia, R.E., $\frac{1}{30}$; L., $\frac{1}{30}$.
" 19. Ophthalmoscope.
" 20. " $\frac{1}{30}$.
" 21. "
" 22. "
" 23. R.E. (E.); L., $\frac{1}{36}$.
" 24. $\frac{1}{24}$.
" 25. R., $\frac{1}{60}$; L., $\frac{1}{60}$.
" 26. $\frac{1}{40}$.

Case 27. Ophthalmoscope, R.E., $\frac{1}{14}$; L.E., $\frac{1}{16}$.
" 28. H. and strabismus.
" 29. Ophthalmoscope.
" 30. $\frac{1}{30}$; ophthalmoscope, $\frac{1}{16}$.
" 31. H., "
" 32. H., "
" 33. H.
" 34. $\frac{1}{30}$.

Myopia.

Case 1. V. R.E., $\frac{20}{60}$; L.E., $\frac{20}{50}$, with $-\frac{1}{12}$.

Astigmatism.

Case 1. R.E., $-\frac{1}{36} \supset -\frac{1}{48}$ axis 180°; L.E., $-\frac{1}{36} - \frac{1}{48}$, 180°.
" 2. R.E., $+\frac{1}{20}^{c}$, axis 90°; L.E., $+\frac{1}{18}$; A., 90°.
" 3. Astigmatism.
" 4. Mixed astigmatism.
" 5. R.E., $\frac{20}{40}$; L.E., $\frac{20}{40} - \frac{1}{12}^{c}$., 180°.
" 6. R.E., $+\frac{1}{12}^{c}$ axis 90 $\supset -\frac{1}{30}^{c}$; L.E., $\frac{20}{30} - \frac{1}{18}^{c}$., 15°.
" 7. R.E., $+\frac{1}{30}^{c} \supset +\frac{1}{14}^{c}$ 90°; L.E., V. $\frac{20}{30}$ E. (?).

Emmetropia.

Case 1. V. $= \frac{20}{40}$. (No reason given in register for amblyopia.)
" 2. E.
" 3. R.E., $\frac{20}{10}$; L.E., $\frac{20}{10}$ +.
" 4. V. $= \frac{20}{30}$.
" 5. V. $= \frac{20}{30}$.
" 6. E. R. E. Left opacity of cornea.

Opacities of the Cornea.

There were eight cases of opacities of the cornea among those of which the refraction was not tested.

There was also one case of diminution of the acuteness of vision, with no assigned cause for the loss. R.E., $\frac{20}{40}$ +; L.E., $\frac{20}{10}$. Not improved by glasses.

This increases the number of cases that may be said to have been examined to 57.

Even a superficial examination of these statistics shows that some of the statements made in my first paper are sustained by them.

There is even a larger proportion of refractive error among them than in the first series. This ametropia is also generally of such a degree as to require correction. That such a correction will in many cases assist in the cure of the blepharitis will hardly be denied. It is a step far beyond this, I admit to say that the blepharitis was caused by the strain from an uncorrected error of refraction. I am not sure, judging from my own experiences in another direction, but that we shall be obliged to modify our views as to how injurious is the strain of accommodation in hypermetropia; but I think that we may still believe that in many cases uncorrected hypermetropia will produce all the consequences of continued hyperæmia of the edges of the lids.

Since the publication of my paper I have seen 40 cases of blepharitis ciliaris in private practice, as follows:

CASE I.—Miss P., æt. 37. Is subject to styes; always has had asthenopia; now has blepharitis. R.E., $\frac{20}{30}$; H., $\frac{1}{48}$; V. $= \frac{20}{30}$. L.E., $\frac{20}{200}$. No improvement from glasses. Under atropia, H. R.E., $= \frac{1}{18}$; L.E., $+ \frac{1}{30} \bigcirc \frac{1}{24}$ 90°; V. $= \frac{20}{30}$. Glasses were prescribed, and two months after the patient writes that the glasses have given her "full satisfaction." There is no account as to the styes or blepharitis.

CASE II.—Æt. 17. About 11 months ago the patient observed that his distant vision was dim; has had asthenopia and blepharitis since then. M. $= \frac{1}{18}$; R.E., L.E., $- \frac{1}{30}$.

CASE III.—C. C., æt. 13. Has had blepharitis and asthenopia for about a year. V. $= \frac{20}{30}$. Under atropia, R.E., $+ \frac{1}{60}$ 90° V. $= \frac{20}{15}$. L.E., $+ \frac{1}{60}$ 90° V. $= \frac{20}{15}$. V. $\frac{20}{40}$ under atropia without glasses. Four months after the patient was using his eyes with comfort.

CASE IV.—F. G., æt. 28. Has asthenopia in the evening and blepharitis constantly. Under ophthalmoscope, eyes are H., rejects glasses. V. $= \frac{20}{20}$. Local treatment alone employed, and one month after the patient was better.

CASE V.—C. H. G., æt. 19. Has had blepharitis for 8 or 9 years, also asthenopia. V. $= \frac{20}{30}$. Under atropia, H. $= \frac{1}{48}$.

CASE VI.—Mrs. B., æt. 42. Has always suffered from asthenopia. Has blepharitis, and there is a chalazion on the right upper lid. H. $\frac{1}{48}$ and $\frac{1}{48}$. There is also marked insufficiency of the interni.

CASE VII.—P. T., æt. 20. The eyelids have been inflamed for two years; asthenopia in the evening; H. by opthalmoscope. Re-

jects all glasses for the right eye, accepts + $\frac{1}{72}$ for the left, under atropia + $\frac{1}{48}$. In a few days there was manifest H. of $\frac{1}{48}$.

CASE VIII.—A. C. B., æt. 25. Asthenopia, blepharitis in left eye for two weeks; under atropia H. = $\frac{1}{36}$.

CASE IX.—Mr. S., æt. 40. Has had red eyelids (edges) as long as he can remember. Sometimes, not often, has asthenopia. V. = $\frac{20}{20}$. Under atropia, R.E.H. = $\frac{1}{48}$; L.E.H. = $\frac{1}{48}$.

CASE X.—D. G. B., æt. 38. Has suffered from redness of the edges of the lids for the past five or six weeks. Has never had asthenopia. V. = $\frac{20}{20}$ — $\frac{20}{30}$, with — $\frac{1}{60}$. With ophthalmoscope eyes seem to be H. Ordered + $\frac{1}{48}$.

CASE XI.—Mr. C., æt. 31. Blepharitis ever since he can remember. No asthenopia. R.E., $\frac{20}{20}$ — L.E., $\frac{20}{20}$. Rejects glasses. Ophthalmoscope shows H. $\frac{1}{24}$ R.E.; L.E., $\frac{1}{48}$. Under atropia, R.E., + $\frac{1}{48}$ ⊂ $\frac{1}{48}$ c 90° $\frac{20}{20}$; L.E., + $\frac{1}{48}$ ⊂ $\frac{1}{60}$ c 90° $\frac{20}{20}$.

CASE XII.—Miss C. A. S., æt. 17. Asthenopia in the evening for a year. Red line along the edge of the lids for one year. V. = $\frac{20}{20}$. Under atropia, H. = $\frac{1}{36}$.

CASE XIII.—Dr. B. Has had blepharitis since he was seven years old. V. = $\frac{20}{20}$. Rejects glasses. H. as with opthalmoscope; atropia, R.E., + $\frac{1}{60}$ c 80°. V. = $\frac{20}{20}$; L.E., + $\frac{1}{60}$ c 90° $\frac{20}{20}$.

CASE XIV.—I. B., æt. 38. Asthenopia for the past four or five years. Has worn glasses, but latterly they have not afforded relief. Redness of the edge of the lids. R.E.H. $\frac{1}{48}$; L., $\frac{1}{36}$ — manifest.

CASE XV.—Miss H., æt. 18. Always has had asthenopia, and the eyelids get red. V. = $\frac{20}{20}$. Under atropia, R.E., $\frac{1}{48}$; L.E., $\frac{1}{48}$.

CASE XVI.—M. M., æt. 7. Eyes "weak" for a year. Slight blepharitis. V. = $\frac{20}{20}$. Advised atropia. No record of ophthalmoscope examination.

CASE XVII.—F. G. D., æt. 19. Asthenopia and slight blepharitis. V. = $\frac{20}{20}$. Under atropia, H. = $\frac{1}{48}$. Two months after, still has asthenopia and inflamed lids.

CASE XVIII.—Mrs. J., æt. 36. Has had asthenopia since she was eight or nine years old; blepharitis for a year. Under atropia, + $\frac{1}{30}$. Ordered glasses, and two months after writes that she uses them with perfect comfort.

CASE XIX.—Miss B., æt. 22. Redness of the edges of the lids as long as she can remember. V. = $\frac{20}{20}$ rejects glasses. Under atropia. R.E., H. $\frac{1}{36}$; L., $\frac{1}{36}$. Two months after, the patient was doing well.

CASE XX.—E. A., æt. 24. Has had sore eyes ever since birth. Has entropion and blepharitis. V. = $\frac{20}{40}$ + R.E.; L.E., $\frac{20}{50}$. Under

atropia, R.E., + $\frac{1}{30}$° 90° $\frac{20}{30}$, L.E., + $\frac{1}{30}$° 120° $\frac{20}{60}$. A year after has worn glasses, and eyelids are much better. An operation for entropion was performed, which relieved it, but the blepharitis remained, when the glasses were ordered.

CASE XXI.—Mrs. A., æt. 23. Eyelids have always been "diseased." Subject to styes. R.E., $\frac{20}{30}$ — L.E., $\frac{20}{50}$. Manifest H. = $\frac{1}{48}$.

CASE XXII.—Miss L., æt. 20. Blepharitis, phlyctenular keratitis. By ophthalmoscope, H. astigmatism. No improvement by glasses.

CASE XXIII.—L. W. D., æt. 14. Lachrymal catarrh, blepharitis. H. by ophthalmoscope.

CASE XXIV.—R. E., æt. 21. Inflammation of the edge of the lids ever since childhood; no asthenopia. R.E., central corneal opacities. L.E., H. = $\frac{1}{30}$.

CASE XXV.—S. J. F., æt. 21. Has been troubled with redness of the edges of the lids for four or five years. Asthenopia under atropia, R.E., + $\frac{1}{48}$c 60° — $\frac{20}{30}$; L.E., + $\frac{1}{48}$ 120° $\frac{20}{50}$.

CASE XXVI.—J. V. W., æt. 22. Eyes "weak" for several years. Lids have been red for several months. R.E., $\frac{20}{30}$; under atropia, L.E., $\frac{20}{50}$. R.E., H. $\frac{1}{36}$; L.E., + $\frac{1}{36}$ ⊃ $\frac{1}{48}$° 90°.

CASE XXVII.—F. G., æt. 22 (?). Blepharitis. Is wearing — $\frac{1}{18}$, selected by himself. V. = $\frac{20}{30}$ with — $\frac{1}{30}$. These were substituted for — $\frac{1}{18}$; three months after lids were much better.

CASE XXVIII.—S. O., æt. 20. Styes for four or five years. Has trachoma and blepharitis. V. = $\frac{20}{50}$. Rejects glasses. Under atropia, H. = $\frac{1}{36}$; V. = $\frac{20}{30}$.

CASE XXIX.—H. D. N., æt. 21. Weak eyes since he was three years old. Blepharitis; accepts + $\frac{1}{36}$. Under atropia, R.E., $\frac{1}{18}$; L.E., + $\frac{1}{24}$. The treatment was of benefit in this case, as stated by patient five months after.

CASE XXX.—B. A. C., æt. 22. Asthenopia, trachoma, and blepharitis. H.M., $\frac{1}{48}$. Declines glasses. Five months after, blepharitis no better.

CASE XXXI.—F. B., æt. 20. For two years has had blepharitis, and has been unable to read at night. R.E., E.; L.E., mixed astigmatism.

CASE XXXII.—E. B., æt. 14. Has had blepharitis for eighteen months, asthenopia for a year. H.m. = $\frac{1}{36}$.

CASE XXXIII.—Jennie Y., æt. 11. Has always had blepharitis. V. = $\frac{20}{50}$ — H.m. $\frac{1}{48}$, and V. = $\frac{20}{30}$.

CASE XXXIV.—Mrs. F. B., æt. 27. Blepharitis for six months. R.E., $\frac{20}{30}$; L.E., $\frac{20}{50}$. Under atropia, R.E., + $\frac{1}{48}$ ⊃ $\frac{1}{30}$° $\frac{20}{30}$; L.E., $\frac{1}{30}$.

CASE XXXV.—Mrs. A. B. De, æt. 29. Blepharitis and asthenopia for four or five years. Has used local applications without benefit, under advice of an oculist. V., $\frac{20}{20}$. Rejects all glasses. Under atropia, + $\frac{1}{36}$ᶜ ; axis, 90°, each eye.

After use of glasses patient is now, six months after, quite well as to lids ; has occasional attacks of asthenopia. The use of atropia did great good to the lids without glasses.

CASE XXXVI.—Mrs. A. E., æt. 41. Has had blepharitis and asthenopia for twenty-five years.

Oph. shows H. ; advised + $\frac{1}{36}$, and patient, who is often seen, states that her eyes are well.

CASE XXXVII.—Miss M. O. R., æt. 21. Has always had blepharitis. Under atropia, H.R.E., + $\frac{1}{48}$; L.E., + $\frac{1}{48}$ᶜ 180°.

CASE XXXVIII.—C. L. W., æt. 11. Blepharitis for one year. Atropia, R.E., $\frac{1}{48}$; L., $\frac{1}{48}$. The patient did well under use of glasses.

CASE XXXIX.—R. D. M., æt. 19. Pain in eyes ; blepharitis for several years. Under atropia, R.E., — 60ᶜ 180° $\frac{20}{20}$; $\frac{20}{60}$ without glasses. L.E., + $\frac{1}{60}$ᶜ 180° ; $\frac{20}{30}$ without glasses.

CASE XL.—Henrietta L. Has blepharitis ; has been wearing glasses for some time in the evening. Under atropia, R.E., + $\frac{1}{4}$ ⊂ + $\frac{1}{48}$ᶜ 90° $\frac{20}{20}$; L.E., + $\frac{1}{44}$ ⊂ + $\frac{1}{36}$ 90°.

CASE XLI.—J. M. C., æt. 22. Blepharitis for ten years ; photophobia ; no asthenopia ; trachoma. V. = $\frac{20}{40}$ — 35. R.E., — $\frac{1}{60}$ ⊂ — $\frac{1}{60}$ᶜ 90° $\frac{20}{20}$; L.E., — $\frac{1}{60}$ ⊂ — $\frac{1}{60}$ᶜ 90 $\frac{20}{30}$.

CASE XLII.—Miss P., æt. 14. Blepharitis and asthenopia. V. $\frac{20}{30}$ — R.E. ; L.E., $\frac{20}{40}$; atropia, R.E., + $\frac{1}{30}$; V. = $\frac{20}{20}$. Patient did well.

CASE XLIII.—Mrs. E., æt. 32. Asthenopia always ; blepharitis. Atropia, R.E., — $\frac{1}{60}$ᶜ, axis 90° ; L.E., E.

CASE XLIV.—Bella P. Blepharitis ; hyperopia, $\frac{1}{60}$.

CASE XLV.—M. N., æt. 7. Asthenopia and blepharitis. H. by ophthalmoscope, $\frac{1}{48}$.

CASE XLVI.—Mrs. C. B., æt. 43. Asthenopia ; blepharitis. H. = $\frac{1}{36}$.

CASE XLVII.—J. W., æt. 9. Asthenopia ; slight blepharitis ; refraction could not be determined.

Summary.—Total number of cases seen in private practice :

Hypermetropia.—Refraction the same in eye. Degree—$\frac{1}{36}$, $\frac{1}{48}$, $\frac{1}{60}$, $\frac{1}{36}$, $\frac{1}{48}$, $\frac{1}{36}$, $\frac{1}{48}$, $\frac{1}{48}$, $\frac{1}{36}$, $\frac{1}{48}$, $\frac{1}{36}$, $\frac{1}{48}$, $\frac{1}{48}$, $\frac{1}{36}$, $\frac{1}{48}$, $\frac{1}{36}$, $\frac{1}{48}$, $\frac{1}{48}$.

When the eyes were of different refraction—R.E. $\frac{1}{48}$, L.E. $\frac{1}{48}$; R.E. $\frac{1}{30}$, L.E. $\frac{1}{36}$; R.E. $\frac{1}{48}$, L.E. $\frac{1}{36}$; R.E. $\frac{1}{24}$, L. $\frac{1}{48}$; R.E. $\frac{1}{48}$, L. $\frac{1}{48}$; R.E. $\frac{1}{48}$, L.E. $\frac{1}{48}$.

Degree undetermined—1.

Total number of cases of H.—25.

Hypermetropic astigmatism.—The same in both eyes, $\frac{1}{60}$, 180°, $\frac{1}{36}$, axis 90°; R.E., $\frac{1}{48}$, a. 60°; L.E., $\frac{1}{48}$, a. 120°; R.E., $\frac{1}{60}$, a. 90°; L.E., $\frac{1}{60}$, a. 90° $\frac{1}{60}$, a. 90°—5.

Of different degrees—R.E., $\frac{1}{60}$; L.E., E.; R.E., $\frac{1}{4} \supset \frac{1}{42}$ c 90°; L.E., $\frac{1}{42} \supset \frac{1}{36}$ 90°; R.E., $\frac{1}{48} \supset \frac{1}{30}$ c; L.E., $\frac{1}{36}$ H.; R.E., $\frac{1}{36}$; L.E., $\frac{1}{36} \supset \frac{1}{48}$ c; R.E., $\frac{1}{48}$, axis 60°; L.E., $\frac{1}{48}$ c, axis 120°; R.E., $\frac{1}{30}$ 90°; L.E., $\frac{1}{20}$ c 120°; R.E., $\frac{1}{60}$ 80°; L.E., $\frac{1}{60}$ 90°; R.E., $\frac{1}{48} \supset \frac{1}{48}$ c 90°; L.E., $\frac{1}{48} \supset \frac{1}{60}$ c; R.E., $\frac{1}{18}$; L., $\frac{1}{20} \supset \frac{1}{24}$ c 90°—9.

Degree undetermined, 1. Total, 15.

Myopic astigmatism.—$\frac{1}{60} - \frac{1}{60}$ c 90°—1.

Myopia.—$\frac{1}{30}$; R.E., $\frac{1}{18}$; L., $\frac{1}{30}$—2.

Mixed astigmatism.—R.E., E.; L., mixed astigmatism—1.

Refraction not determined—2.

These statistics are certainly very different from those given by Dr. A. Alt,* who examined forty-eight cases of blepharitis with a view to test the connection between ametropia and inflammation of the lids. According to Dr. Alt, "thirty-nine of them had emmetropia, five myopia, three hyperopia, one astigmatism." I know of no way of reconciling Dr. Alt's statistics with my own, since there is no record of the manner in which the refraction was estimated, or of what Dr. A. considers an emmetropic eye. I do not regard any eye as emmetropic, which, not having V. $\frac{20}{20}$, obtains it under the influence of atropia with a convex glass of $\frac{1}{60}$ or upwards; neither do I regard the test by the ophthalmoscope as sufficient to determine the existence of latent hypermetropia.

Dr. F. C. Hotz † examined eighteen cases in private practice, "of which five, or thirty-three per cent., showed ametropia (four showed hypermetropia, one myopia, and one astigmatism (6?)). Dr. H. did did not use atropia for the determination of the refraction in his cases; and he concedes that, had he employed it, some of his cases might have shown a slight degree of hypermetropia. Dr. Hotz is, however, of the opinion that, however great may be the proportion of

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* Archives of Ophthalmology and Otology, Vol. VI., p. 180.

† Chicago Medical Journal, April, 1878.

ametropia, there is no etiological connection with this and blepharitis. Dr. H. is mistaken, I think, in his statement that Dr. Erisman examined his cases under atropia. The mistake is all the worse because a correct account of Erisman's statistics rather makes for Hotz's views than against them. Erisman * states that under atropia it is probable that there would be a larger percentage of H. than he found and that the hyperopic eye is probably the normal one in youth.

Dr. Hotz assumes that no strain on the accommodation occurs in myopic eyes unless they are armed with unsuitable glasses. I believe that not only those that have improper glasses, but also those myopes that wear no glasses at all, suffer from strain.

Dr. Hotz's argument against the occurrence of blepharitis without asthenopia may be answered by my own experience and that of my associate in practice, Dr. E. T. Ely, as follows: We have seen many cases of blepharitis without noticeable asthenopia. Some of these were cured for the time by a simple paralysis of the accommodation by means of atropia, and many are the cases that have been treated for years without apparent benefit, which were entirely relieved of their unsightliness and discomfort after glasses were worn in conjunction with a simple local treatment.

There is no probable way of accounting for the cure in these cases, except by a reference to a correction of the error of refraction. In saying this, I am very far from asserting that every case of blepharitis is caused by an error of refraction.

I cannot agree with those who have objected to my views, who argue that slight degrees of H. seldom give rise to asthenopia. My experience is just the other way. Of course, I consider a $\frac{1}{2}\frac{1}{5}$ a low degree; perhaps a $\frac{1}{2}\frac{1}{4}$ is the first point at which H. may be said to be at all of a high degree; certainly there is often great relief from the correction of a $\frac{1}{4}\frac{1}{8}$, or even a $\frac{1}{6}\frac{1}{0}$, when that sixtieth is in one meridian only, while the other is emmetropic.

Donders regards the degrees of H. from $\frac{1}{1}\frac{1}{0}\frac{1}{0}$ to $\frac{1}{4}\frac{1}{0}$ as not to be observed in youth. Under ordinary circumstances I grant this, but in some cases I am inclined to the view that $\frac{1}{4}\frac{1}{8}$ may need correction after ten years of age, or least for a time.

In others, as I have shown in another paper, a $\frac{1}{2}\frac{1}{4}$ may exist even in the eyes of a student, and never cause any inconvenience of any nd. When all the factors are at work that produce asthenopia, epharitis, and so forth, even a very slight error of refraction

* Graefe's Archiv, B. 17, A. I.

will materially assist in making the patient uncomfortable, and its correction will do great good.

Dr. Hotz is of the opinion that blepharitis occurs chiefly in children. I am not sure that this is a fact; certainly those cases observed by me in private practice were chiefly among adults. Of two hundred and one cases seen at the Manhattan Eye and Ear Hospital, a little more than fifty per cent. occurred in persons under fifteen; but of very young children, that is, of five years of age or under, there was only twenty-eight per cent., whereas Dr. H. states that he has observed the greatest number among these. Dr. H. asks if I omitted young children from my statistics, because I could not employ the tests of vision. I answer that I have inserted in my statistics every case that has presented itself to me. Because children do not read and write, it cannot be argued, however, that they do not use the ciliary muscle and interni. Any one who has watched a child at play, for instance, picking up small objects for a number of minutes at a time, will soon be convinced that they are often using a great deal of accommodative power, in their effort for exact vision, before they learn to read and write.

If Dr. Alt and Dr. Hotz will examine their cases under atropia, I am sure they will form different conclusions, as to the existence of ametropia in connection with blepharitis ciliaris, from those that they have expressed. I still believe that there is much more than mere coincidence in the frequent occurrence of blepharitis in connection with strain on the accommodation from refractive defects and opacities of the cornea, and that correction of the error will do as much towards the relief of the hyperæmia and inflammation of the lids as the correction of hypermetropia does for asthenopia. I suspect, however, that since Donders' exposition of asthenopia we have all overrated the curative power of glasses, and that some writers have been led greatly into error in ascribing nervous affections too exclusively to the influence of an uncorrected error of refraction. Certain it is, as I have before indicated, that there are many cases where quite a high degree of uncorrected hypermetropia does no harm to the subject of it.

LACHRYMAL CONJUNCTIVITIS AND SOME OF THE OTHER INJURIOUS EFFECTS OF RETENTION OF THE TEARS.

By J. S. PROUT, M.D., of Brooklyn, N. Y.

THE retention of the tears in contact with the tissues of the eye causes disease of the conjunctiva, cornea, and lids, and aggravates and indefinitely prolongs existing diseases of those parts, although these diseases themselves may have caused the stillicidium. Thus cause and consequence exchange places, but the conjunctivitis, keratitis, or blepharitis *cannot be cured* while the stillicidium persists.

A strange outgrowth of the theory of the older authors, that inflammation of the tear-passages depends upon a specific quality of the lachrymal secretion, appears in the motto which Martini in 1843 prefixed to his work *On the Influence of the Tears on the Human Eye*: Des Auges tödtlichster Feind ist die Thränenflüssigkeit (the deadliest enemy of the human eye is the lachrymal secretion): (*Schirmer, Graefe-Saemisch Handbuch*, vii. 1, p. 33). More moderately and more correctly Mackenzie says: "The tears are at all times an irritating secretion. The conjunctiva is instantly reddened when they flow; and although we were to grant that this was consentaneous with determination of blood to the lachrymal gland, preceding the discharge, yet we observe that if the tears are so profuse as to run over the cheek, the skin with which they come into frequent contact becomes inflamed and excoriated." (*Dis. of the Eye*, Phila., 1855, p. 149.)

Saemisch says that the hyperæmia of the conjunctiva which is caused by blepharitis or disturbances of the tear-conducting apparatus, yields spontaneously as soon as these pathological conditions are removed. (*Graefe-Saemisch Handbuch*, iv. 1, 9.) He also speaks of a "*circulus vitiosus*," the members of which are: catarrh of the conjunctiva, blepharitis angularis, dermatitis angularis, eversion of the lower lachrymal puncta, epiphora, lodgment of fluids in the conjunctival sac, *catarrh of the conjunctiva*. From these follow blepharitis ulcerosa, ectropium, keratitis. (p. 14.)

The stillicidium that is caused by eversion of the lower punctum causes irritation of the skin of the lids, loss of tissue, and shrinking. p. 62.)

Schirmer speaks of "conjunctivitis lacrymalis *nach* Galezowski," the conjunctiva bulbi, plica semilunaris and caruncula lacrymalis being inflamed, either from inflammation extending from the tear-passages, or through the special irritation caused by the mucus which escapes from the puncta, or by the simple retention of the tears. A further result of the constant wetting of the edges of the lids by the tears is the almost unending blepharitis ciliaris. The epiphora becomes permanent and dacryocystitis and blepharitis stand in an evil relation to the overflow of the tears. (*Graefe-Saemisch Handbuch*, vii. 1, p. 23.) He expresses the opinion that the conjunctivitis and blepharitis that occur in the course of dacryocystitis are only the results of the presence of the tears, and of the mucus which escapes from the sac by the puncta. (p. 32.)

Schweigger speaks of chronic conjunctivitis and blepharitis as secondary inflammatory processes caused by strictures of the nasal duct. (*Handbook of Ophthalmology*. Translated by Farley. Phila., 1878, p. 214.) Severe inflammation of the edges of the lids may occur as a consequence of other diseases which have caused long-continued hyperæmia of the conjunctiva and abnormal retention of the lachrymal secretions. (p. 218.) He also speaks of a "vicious circle." "Especially is the tear-passage to be kept open, since a perpetual dripping of the tears has a most hurtful influence." (p. 220.) "Among the local causes which induce or maintain conjunctivitis are strictures of the nasal duct," &c. (p. 255.)

Wells, in speaking of stillicidium lacrymarum and its results, says that if the true nature of this irritability of the eye and of the lachrymation is overlooked, very obstinate and intractable inflammation of the edges of the lids and of the conjunctiva may ensue, which sets defiance to every form of collyrium or topical application, but readily yields if the impediment in the lachrymal apparatus is removed, and the stillicidium cured. The obstruction to the efflux of the tears may be situated at any point of the lachrymal canal, in the puncta, the canaliculi, the sac, or the nasal duct. (*Diseases of the Eye*, 2d ed., 1870, p. 653.)

The first special paper on this subject is by Galezowski (*Mal. des Yeux*, Paris, 1872, p. 157), to whom we are indebted for the term "Lachrymal Conjunctivitis." (See also *Gaz. des Hôpitaux*, 1868, p. 430, and Fitzgerald, *Dublin Jour. Med. Science*, Nov., 1869, p. 675.) I have not time to reproduce this paper here, though it well deserves our fullest consideration.

Notwithstanding the references to the pernicious effects of the tears

upon the conjunctiva, &c., which I have been thus able to make, the importance of these effects and their recognition and proper treatment receive less attention than should be given to them. In Vienna, at the clinic of Prof. Stellwag, I saw this matter neglected; and in his great work on the Eye, 4th Am. Ed., 1873, under Catarrhal Conjunctivitis, p. 373, the effect upon the conjunctiva of the constant presence and running over of the tears seems inadequately referred to. In the chapter on Trachoma, p. 410, we are told that eversion of the lower lid, which often occurs, "by continuous dropping of the tears, leads to erythematous inflammations and excoriations of the lids and cheeks, and subsequently to their shrinkage; and thus the improper position of the lid is increased and at the same time the inflammation in the conjunctiva and cartilage maintained, and further degeneration favored." This reference is enough, when carefully sought for and freely interpreted, to prevent the case from going by default; and so perhaps is the clause under the head of Treatment, p. 410, calling for the "removal or keeping away of all injurious influences which may possibly increase or maintain the process." On p. 501, "Blennorrhœa of the Lachrymal Passages," we are told that "the frequent combination of dacryocystoblennorrhœa with catarrhal conjunctivitis and blepharitis ciliaris is worthy of mention. These are often secondary, from the contact of the products from the lachrymal passages with the conjunctiva, and the opportunity for the excessive formation of crusts on the edges of the lids."

Prof. Arlt, in his chapters on operations (Graefe-Saemisch Handbuch, B. III.) describes Bowman's method of slitting the canaliculi, giving certain indications for its performance, but says no word to indicate that the relief of conjunctivitis or blepharitis is among these indications.*

In Zurich I saw the connection between stillicidium and chronic conjunctivitis disregarded.

At Moorfields Ophthalmic Hospital, London, a case of chronic conjunctivitis with everted puncta and wet, soaked, irritated edges of the lids, presented himself to one of the attending surgeons—a man

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* May not this be considered the great defect of this noble work? *Each* author should have given the operative as well as the medical treatment of the pathological conditions he described. Another defect almost equally great, in another direction, is that there is no index either for each special subject or for the whole work.

of world-wide reputation outside of ophthalmology—who said, in reply to a question, that the everted puncta and the stillicidium were caused by the conjunctivitis, and had nothing to do with keeping it up. He forgot the vicious circle, for it would be the height of presumption to say that he did not apprehend it.

As the retention of the tears in contact with the conjunctiva, &c., is the cause of the trouble under consideration, the diagnosis resolves itself into determining whether the tears are or are not carried off sufficiently freely or at all, and whether, in any given case where the tears remain temporarily in contact with the tissues, they are exciting a prejudicial action. The diagnosis of stillicidium is sufficiently well understood to require no special elucidation here—time and space are too limited. In many cases the wet edges of the lids at once attract the surgeon's notice; often, however, this condition is so slight that one may feel doubt as to the existence of stillicidium. Wells calls attention to the important fact that the punctum may be at the apex of a nipple-like prominence, so that the entrance of the tears is rendered difficult. (Op. cit., p. 654.)

In considering the matter of treatment, it is well to bear in mind the dictum of Schirmer, that "wounds of the posterior wall of the canaliculus, whilst the other parts are undisturbed, have not the slightest evil results, as is shown by the daily performance of the operation for slitting them." (Op. cit., p. 23.) Therefore, when, as sometimes happens, there is doubt as to the actual condition, it is well to give the patient the benefit of a carefully performed operation. At the same time it is not to be forgotten that the obstruction may be of a temporary character and may yield to the usual treatment of conjunctivitis. The writer recalls a case of dacryocystitis, in a child, that yielded readily to a weak alum solution as a collyrium. But in the very large proportion of cases the observant practitioner will at once perceive the necessity for an operation.

It is not the purpose of this paper to discuss cases that require the use of the sound to dilate strictures of the nasal duct. These are not likely to be overlooked. Nor do I wish to consider the treatment of strictures of the canaliculi, but only faults of the puncta. For this the full slit as made by Bowman is not necessary. It is only needful to obtain an *enlarged* punctum in a more favorable position. To do this when there is no or but slight displacement of the punctum (the inferior is now under consideration, as it is seldom necessary to interfere with the upper) the edge of the lid is put on the stretch, as for Bowman's operation, one of the points of a delicate

pair of scissors is introduced into the canaliculus at right angles to the edge of the lid, carried as far in this direction as possible, and the tissue between the blades divided by one quick stroke. In the depth of the wound the beginning of the horizontal part of the canaliculus can be seen. The fluid in the lacus lacrymalis now lies in contact with the slit thus made, and if the canaliculis is pervious the tears are carried into the sac. This is a modification of Bowman's operation as done with the scissors, and might well receive the name *Bowman minor*.

The tendency of the edges of the incision to unite is not greater than in the ordinary operation when done as a preliminary to the use of the sound. The usual result is an enlargement of the punctum *towards* the reflected portion of the conjunctiva of half a line to a line.

When there is much eversion of the punctum or tumefaction of the conjunctiva, the operation is the same, with the addition of the removal of a piece of the conjunctiva somewhat as proposed by Mr. Critchett in his Lectures on the Diseases of the Lachrymal Apparatus, *Lancet*, 1863, Vol. II., p. 697; (referred to by Wells, op. cit., p. 657), as follows: "Occasionally, however, I have found that the eversion is so considerable, owing to the thickness and swollen condition of the lower lid and its inner lining, that even the canal when laid open remains everted and the tears do not reach it, but still flow over. Under these circumstances I have been in the habit of seizing a portion of the posterior wall of the canal and snipping it out with scissors, thus effecting the treble objects of drawing the canal more inward toward the caruncle, of forming a reservoir into which the tears may run, and of preventing any union of the parts." When the fault is in the punctum and not in the canaliculus, the complete slitting of the latter is not necessary. The modification proposed by Mr. Critchett shares the same condemnation; but a modification of the latter, called, for brevity, at the Brooklyn Eye and Ear Hospital (where it has been long in use, author's name not known), *Critchett minor*, is believed to fill, in a very large proportion of cases, all the indications required. It consists of the operation called Bowman minor, with the addition that by means of a fine-toothed forceps the conjunctiva at the *end* of the perpendicular incision is seized and a circular or triangular piece is cut out with scissors from the inner surface of the lid towards the cul-de-sac. This piece may vary from one line to three or four lines in diameter. Thus we obtain the treble results (in Mr. Critchett's words) "of

drawing the canal" (the new and enlarged punctum rather) "more inward toward the caruncle, of forming a reservoir into which the tears may run, and of preventing any union of the parts." * In addition, it is a good operation for the cure of eversion. The writer has seen quite decided correction of the position of the margin of the lid thus obtained.

This is, in the strictest sense of the word, an extemporaneous operation, can be done with four cuts of the scissors, and requires no anæsthetic in the writer's practice. He is in the habit of doing it in the consulting-room without making any preliminary explanation to the patient, who is, as it were, taken by surprise, and whose resistance is *anticipated, not invited.*

In Jones' *Ophthalmic Medicine and Surgery*, Am. Edition, Phil., 1863, p. 399, the editor mentions an operation "recently proposed" by Mr. Haynes Walton, for the relief of eversion of the punctum when caused by a slight ectropium: "With a very small scalpel and a fine cross-tooth pair of forceps, a bit of the conjunctiva just posterior to the canaliculus, and from over the entire thickness (?) of the cartilage, is dissected off. The wound is left to cicatrize, and the manner in which the punctum is righted is surprising.—ED."

For more than six years the diagnosis "Lachrymal conjunctivitis (Galezowski)" has been made at the Brooklyn Eye and Ear Hospital.

The following illustrative cases—two from private, the others from hospital practice—are appended:

CASE I.—The Rev. D. R. B., in good general condition, consulted me on Dec. 13, 1870. He had long been troubled by weakness of his eyes, for which during the preceding year he had consulted Dr. Liebreich in Paris, who prescribed glasses for astigmatism and gave him a lotion and an ointment; but there was no improvement. I found the lids swollen, with incrustations along the edges, and swelling—papillary engorgement—of the palpebral, slight injection of the ocular conjunctiva. The inferior lachrymal punctum of the left eye was somewhat everted, in consequence of the swollen condition of the conjunctiva, causing stillicidium, though the punctum and canaliculus were open. In order to allow the tears to pass off by the natural channel, I enlarged the punctum downward and removed a small triangle of conjunctiva from the inner surface of the lid (Critchett minor), then

* See remarks on this subject by Mr. J. F. Streatfield, in the Royal Ophthalmic Hosp. Reports, Vol. I., p. 103.

applied argent nit. mit. to the conjunctiva, and prescribed a chloride of zinc wash and diluted citrine ointment. He returned in four days, reporting his condition very much improved; could use his eyes much more freely than before. Two weeks later he was not so well—the stillicidium had returned in consequence of the closure of the small opening made; the piece removed had not been large enough. The operation was therefore repeated and a larger piece of conjunctiva removed. Arg. nit. mit. lightly applied.

He returned Feb. 11, 1871, reporting the left eye better than it had been for a long time. As the right eye was affected in a similar manner, though in a less degree, I also removed a triangular piece of conjunctiva from the lower lid. The use of the wash and ointment was continued.

The result was entire relief for years of the inflammation of the eyelids; he was able to use his eyes with ease. In Feb., 1877, during my absence, he consulted Dr. A. Mathewson, whose memorandum, kindly furnished me, states that his lids trouble him at intervals after use.

CASE II.—W. A. K., aged about eight years, consulted me in 1876 for conjunctival disease, for which he had been treated unsuccessfully by a New York City oculist. My notes state that the conjunctiva of the lids was roughened, though not fairly granular, and that there were some phlyctenula-like vascularities near the cornea. (See Galezowski, op. cit., p. 158). Atropine solution was instilled, a borax and camphor wash and a camphor ointment (camphor ice), prescribed. Under this treatment he improved. May 18th of this year he came to me again. There was stillicidium, the inferior puncta being slightly everted; the palpebral conjunctiva was injected and thickened from papillary engorgement; there were the same phlyctenula-like vascularities that were before noted; each cornea was clear. I considered the case one of lachrymal conjunctivitis, in which, the cause continuing to act, the treatment adopted had only been followed by temporary relief. The puncta and canaliculi were therefore slit, the latter for about one line only (Bowman minor). No applications were made; a wash containing borax and tannin was prescribed; the openings made closed, so that it was necessary to repeat them, after which decided improvement resulted, which was increased by a slight use of blue-stone.

CASE III.—Mary H., aged 30. Brooklyn Eye and Ear Hospital, 16752, 1878. Lachrymal conjunctivitis. Her eyes have been sore for twelve years; have had treatment at different times; they are

now often very sensitive to light, the edges of the lids are reddened and sodden-looking at outer and inner angles, conjunctival surfaces of lids look as if they had been granular but now are quite smooth, corneæ very slightly nebulous. The slightly everted puncta failed entirely to carry away the tears, and as a consequence the inflammation persisted. The inferior puncta were cut and pieces of conjunctiva removed from the inner surfaces of the lower lids (Critchett minor), so as to secure free carrying off of the tears. Marked improvement followed.

CASE IV.—F. (Case 7853, Brooklyn E. and E. Hospital) had been operated on by Graefe's method for cataract, O. S. Feb., O. D. April, 1878. On July 2d, finding that there was much annoyance from stillicidium, O. D., causing conjunctival irritation, I did a Critchett minor, which was followed by much improvement, and this still continues. The lids were dry the next day.

CASE V.—J. L., aged 45, March 28, 1872 (Case 5191, E. and E. Hospital). Lachrymal conjunctivitis. His eyes have watered for years. Bowman's operation was done on each lower lid and an alum wash given. Three months later he said that his eyes were more comfortable than they had been for years. The tears ran down through the ducts.

CASE VI.—E. and E. Hospital, 9677, Jan'y 16, 1875. Lachrymal conjunctivitis, caused by everted puncta. Critchett minor was done, removing pieces of conjunctiva from lower lids, and a sulphate of zinc wash given. Fifteen days later there was much improvement visible.

CASE VII.—E. and E. Hospital, 16385, April 2, 1878. There is eversion of the inferior puncta from blepharitis, which is kept up by the continual soaking of the tears. Critchett minor on both sides was performed, a ten gr. sol. arg. nit. applied, and a borax wash given for frequent use. April 27.—The eyes are dry, the tears pass down by the natural channels. The use of the sol. arg. nit. was continued after the operation.

CASE VIII.—E. and E. Hospital, 16554, April 23, 1878. Trachoma both eyes. O. D. has a central ulcer of the cornea. The edges of lids are constantly bathed in the lachrymal secretion, which cannot be carried away on account of the faulty position of the inferior puncta. This aggravates all the other symptoms. To relieve it did Critchett's operation on both lower lids, and gave a sulphate of zinc wash; April 25th, improvement marked; tears go down by ducts; ten gr. sol. arg. nit. July 20.—O. D., ulcer perforated some

days ago; patient attended irregularly; O. S. granulations much improved. Both eyes are dry, the tears passing down by the nasal ducts.

It may not be out of place in conclusion to say a few words on what appears to the writer the best method of performing Bowman's operation. The most recent English work on the diseases of the eye, by Mr. Carter, appeared in 1875. He gives the following description (p. 221): "The surgeon carries the knife horizontally along the canaliculus, *cutting edge upwards* (italics mine), the knife is raised from the horizontal to the perpendicular position, and it divides the whole length of the canaliculus during the movement."

In Mr. Wells' work on the eye we find the statement that the knife should be run "with its *sharp edge upwards* (italics mine), along and quite up to the extremity of the canaliculus, and the latter be divided along its whole course by lifting the knife somewhat from heel to point." (2d Ed., 1870, p. 655).

I am not able to refer to Mr. Bowman's own description of his operation, but it may fairly be supposed that Mr. Wells, one of the surgeons of the hospital in which Mr. Bowman has done so much and so excellent work, gives a correct description of the operation. On the other hand, Prof. Arlt says that the cutting edge of the knife or scissors must be so directed that the wound shall gape up or down and *backwards*. (Graefe-Saemisch Handbuch, iii. 480.)

Wecker says the edge of the knife should always be directed *towards the globe of the eye* (italics mine) so that the artificial opening may present in the same direction. (Mal. des Yeux, 2d Ed., 1867, T. i., p. 867).

The writer has been led by observation, and not by either of these authorities, to adopt the following method of operation on the inferior canaliculus: The lid is drawn downward and outward as fully as possible, the probe-point of the knife is then introduced perpendicularly into the punctum with *the cutting edge of the knife turned towards the ball;* when the knife takes the horizontal position the edge is turned *still more towards the inferior cul-de-sac*, and in this position is pushed along the canal as far as desired, and is then made to cut out by moving the handle in an inward slightly upward direction. The result is a curved incision, the convexity of which is directed downward, which presents its canal to the lacus lacrymalis. The advantages of the method are that the tears are well carrried off, the wound is well hidden behind the margin of the lid, it serves well for probing, and

has, perhaps in consequence of the free movement of one lip upon the other, less tendency to unite than the ordinary incision made with the "sharp edge upwards." Except that it has no power to correct an eversion, however slight, it has the advantages claimed by Mr. Critchett for his modification of Mr. Bowman's operation.

The writer is aware that this paper contains very little that may not be found already in print, but still he feels that the subject is of so great importance that there is no need to apologize for its presentation.

EXTIRPATION OF THE OSSIFIED CHOROID WITHOUT ENUCLEATION OF THE EYEBALL. By Dr. Henry W. Williams, Boston.

On the 7th of December, 1877, I saw Mary D., aged 21. She stated that her right eye was lost from scarlatina at two years of age. Her eyeball was slightly smaller than the other, the cornea and iris of unhealthy aspect, and the lens yellowish and shrunken, with adhesion of the disorganized iris to its surface. There was no marked injection of the vessels, but the globe was slightly tender on pressure, and, she said, was at times painful.

The deformity was considerable; and as, furthermore, sympathetic ophthalmia was to be apprehended, I advised the removal of the anterior part of the eye, including the ciliary region and the crystalline lens, informing the patient that she would thus have an excellent stump for the support of an artificial eye.

The patient was etherized, and an incision made as proposed, by transfixing the eyeball. But, unexpectedly, the knife encountered hard material in the parietes of the globe, and on examination after removal of the anterior portion it was found that the choroid had undergone osseous transformation.

As previous to etherization I had given the patient to understand that the eye was not to be enucleated, I determined to remove the osseous shell and leave the sclera. Only a thin serous fluid occupied the vitreous space. The wound was brought together with five fine sutures. No suppuration or inflammation followed. At the end of ten days the sutures were removed, and the patient had fully recovered in two weeks, with a linear cicatrix, and with much less shrinking of

the sclera than was expected. This good condition remained some months after.

The excellent results of this novel procedure, and the similar good conditions obtained by the scooping out of the contents of the globe, without removal of the sclera, in cases of ophthalmitis, would indicate that removal of the anterior portion of the eye might often be substituted for enucleation in cases where an operation is indicated to avert the danger of sympathetic inflammation, and that such removal, with evacuation of the contents of the eye and extraction of bits of percussion-cap or other foreign body, might be quite sufficient in many cases of traumatic injury where we have been accustomed to advise ablation of the entire globe.

Even though recovery may be a few days later than after enucleation, the patient gains immense advantages where a portion of the tunics of the eye can be preserved; if in good circumstances, he can wear an artificial eye with far greater comfort and advantage, and if unable to afford the expense of these, he has far less annoying secretion from the conjunctival cavity than where the eyeball has been wholly excised. Of course these considerations would be trivial if, after the operation here recommended, there remained any risk of sympathetic inflammation of the other eye; but the removal of the ciliary region, together with any foreign body, provided such may be lodged within the eye, seems to offer ample security against this danger.

CASES ILLUSTRATING TWO RARE DISEASES OF THE EYELIDS. By CHARLES STEDMAN BULL, M.D., New York.

I. TARSITIS SYPHILITICA—GUMMY INFILTRATION OF THE TARSUS.

INFILTRATION of the tarsus with a gummy deposit is a rare lesion in constitutional syphilis.* *Michel* describes it as a chronic indolent infiltration of the tarsus, which does not involve the external skin. The process of infiltration is, however, not always an indolent or passive one, if one may judge from an experience of a single case. *Magawly* has described four cases of this kind in the *St. Petersburger Med. Zeitschrift*, Bd. XII. heft 4, and his paper is referred to by both *Nagel* and *Michel*. In two of his cases the lower lid was involved in an apparently homogeneous, non-fluctuating tumor of the size of a small pigeon's egg, accompanied by some little œdema of the conjunctiva and swelling of the rest of the affected lid. In his other two cases the upper lid was involved and the tumor more circumscribed. In one of the latter cases, after the tumor had disappeared, it was found that the tarsus had entirely lost its normal resistance.

In 1873 *Vogel* wrote an inaugural treatise entitled, "Perichondritis of the Tarsal Cartilage," in which he reports a case of syphilitic infiltration of the tarsus, resembling *Magawly's* cases. The affection was characterized by a marked swelling and redness of the lids of the left eye. The swelling was not homogeneous, but varied in density in different places. The margin of the lid was movable over the swollen parts and intact, with the exception of a small spot of ulceration. *Vogel* regarded it as a chondritis or perichondritis of the cartilage of the lid. If we accept *Waldeyer's* view that the tarsus contains no cartilage cells, this cannot be regarded as a chondritis. After seven weeks of administration of potassium iodide the swelling of the lids entirely disappeared. In this case the primary lesion had occurred eight years before.

In the "Klinische Monatsblätter für Augenheilkunde" for January, 1878, *Fuchs* reports three cases of tarsitis syphilitica, met with in Arlt's clinic during the past four years. The first case was a man with a dense, smooth, painless swelling of both lids of one eye, which

* Graefe und Saemisch, Handbuch der Augenheilkunde, IV., 1, p. 441.

had lasted for four weeks. The period of infection was not known, but was probably recent, as there was still upon the glans penis a partially cicatrized ulcer, a papular syphilide upon the face and body, and enlarged cervical glands. The patient could not open the eye, but the lids were easily everted. The tarsus was very much thickened, but retained its normal shape in both lids. Conjunctiva not involved; entire loss of cilia on both lids; small ulcer at external commissure of lower lid. In about four weeks the patient was discharged cured. *Fuchs'* second case was a woman, æt. 34, who contracted a chancre four years before, followed by various constitutional symptoms, among others, left hemiplegia, from which she recovered in four months. Two years later the left upper lid began to swell, and the infiltration became so dense that the eye could not be opened. Six months later this ulcerated, remained open for four months, and then healed, the lid gradually regaining its normal state. Six months before *Fuchs* saw her the same thing developed in the right upper lid. The whole tarsus was very much thickened, but retained its general shape, and here also the cilia were wanting. The same treatment by mercurial inunction and potassium iodide gave the best results, though requiring a somewhat longer time than in the first case.

Fuchs' third case was a man, aged twenty-eight—initial lesion six years before. In this case the process was a rapid, active infiltration accompanied by great pain. It was in the right upper lid and had lasted eight days. It grew so rapidly and the pain became so severe that an incision was made in the tarsus, which showed a brawny yellow surface, and there was no hemorrhage. By constant use of mercurial inunction, potass. iod., and the local application of tincture of iodine for three weeks, the swelling of the lid began to diminish, and at the end of two and a half months the patient was discharged much relieved, though the tarsus was still hypertrophied, but soft and yielding, and the pain had entirely disappeared. The final result reached in this case is not known.

The following case was under the writer's care during the past year, and its rarity will perhaps excuse a detailed account.

The patient was a young man, aged twenty-seven, a bartender, who applied for treatment in November, 1877. He had contracted syphilis about four years before, the initial lesion having been on the glans penis near the mouth of the urethra. The chancre did not heal for nearly six weeks, and in the meantime he had enlargement of the inguinal glands and a general eruption all over his body and face. The next manifestation of constitutional trouble was a series of

mucous patches in the mouth and on the tongue, and a painful ulceration on the right side of the fauces. During the second year there appeared another eruption, which was papular, and his hair began to fall out. He had never had any systematic or long-continued treatment. His eyes had been always perfectly sound until six weeks before I saw him, when he noticed that the lower lid of the left eye felt heavy and large; and on looking in the glass the lid was seen to be slightly swollen, the skin a little reddened, and the conjunctival surface felt rough. There was no pain and no secretion of any sort, and vision was undisturbed. These symptoms continued to slowly increase, without any pain or discharge, until he presented himself for treatment. When I saw him the lower lid of the left eye was very much swollen, making a tumor as large as a robin's egg, the skin very much reddened over it, and the swollen lid pressed closely against the eyeball. The tumor was hard, resisting, solid to the touch, and absolutely painless. The lid could not be everted, but by pulling it away from the eye the conjunctiva was seen reddened, but not markedly so. The tumor seemed to be homogeneous throughout, and for some time past had caused constant epiphora from compression of the punctum and canaliculus. There was a pustular eruption on the face and neck, and a few spots on the dorsum of the hands. Convinced of the syphilitic nature of the palpebral lesion, I placed the patient immediately upon the mixed treatment, using half an ounce daily of mercurial ointment upon the soles of the feet, and commencing with potass. iodid., grs. xv., three times a day, and rapidly increasing the dose. After about ten days of this treatment the swelling of the lid began to soften, and the inunction was used on alternate days. At the end of the third week the swelling had diminished considerably, and the mercury was discontinued, the potass. iodid. being given in grs. xxx. doses. At the end of the sixth week the tumor had entirely disappeared, the lid resumed its normal consistency and motility, and the cutaneous eruption was rapidly fading out; and at the end of the eighth week the patient was discharged cured.

This seems to have been a gummy infiltration of the entire substance of the lid. As the tumor disappeared and the patient recovered, we have not the advantage of a microscopical examination of the lesion, but the infiltration, in all probability, started in the tarsus, and spread thence to the other tissues of the lid. The conjunctiva did not seem to be involved. After the extreme density of the swelling had given way, the seat of the hypertrophy was easily lo-

cated in the tarsus, which retained more or less perfectly its shape. In this case there was a complete absence of the cilia on the lid, due probably to compression of the hair-follicles by the gummy infiltration of the surrounding tissue. After the swelling had diminished sufficiently to admit of eversion of the lid, in various places through the conjunctiva could be seen a brawny, yellowish-white appearance of the infiltration, which slowly disappeared as the absorptive process went on. The cure is probably not a complete one, for with so much and dense an infiltration there must result more or less deformity of the tarsus, either from absorption by compression, or from softening of its tissue. In all the cases reported, this making the ninth, the course seems to be a very chronic one, though a cure is no doubt hastened by an energetic antisyphilitic treatment.

II.—Amyloid Infiltration of the Lid and Orbit.

Antonio D., æt. 4½, born in New York of Spanish parents. Child has never been robust, and is of marked strumous diathesis. Has had frequent attacks of phlyctenular keratitis, and bears numerous cicatrices in the neck of former glandular suppuration. Has a pale, waxy complexion, feeble pulse, and is of stolid demeanor. First seen by the writer on January 24, 1876. About three weeks before, the child woke up one morning with a slight redness and swelling of the outer part of the left upper lid, near the orbital margin. There was no pain and no secretion from the conjunctival surface. These symptoms steadily increased until he was brought for treatment. At this date the left eye was almost completely closed by the overhanging swollen lid, and the child had lost all power over it. The skin was moderately reddened, but there were no superficial vessels visible either on the lid or vicinity of the face. The swelling was a tense, hard, uniform thickening of all the tissues of the lid apparently, being most marked near the outer canthus. The eyeball was markedly limited in its motility upward and outward, but moved freely in other directions. The media were clear, and there was nothing abnormal to be seen in the fundus. The lid could not be everted, and the sulcus between the lid and the superior margin of the orbit was filled up by the inflammatory process, so that the finger could not be pressed in between the roof of the orbit and the eye. There was no tenderness on pressure along the orbital margin, and the child never complained of any pain. It seemed probable that this was a low

grade of cellulitis of the lid and its attachments, and possibly also of the tissues of the orbit. The infiltration was limited on the temporal and nasal sides by the external and internal canthal ligaments, but spread back into the orbit. The symptoms slowly progressed to February 16th, when there was a decided increase in prominence of the upper lid, the eyeball was pushed more downward and inward, and at the same time there began to be some exophthalmus. All motion of the eye upward was lost. The palpebral and ocular conjunctiva was very much injected, and there was some muco-purulent secretion. Vision was still normal, and there was no change visible in the fundus. For the last two nights the child had complained of pain in the orbit and forehead. Two days later the preauricular gland was noticed to be indurated and swollen, and the general condition of the child was unsatisfactory. Up to this time a simple tonic, restorative, and expectant plan of treatment had been followed out, and in addition, potass. iodid. was now administered. On March 1st the symptoms were all very much increased—the exophthalmus more marked, very little motion of the eye; there was an ulcer of the cornea just above the centre, with a rather wide zone of opaque infiltration around it—the preauricular gland was larger, and the swelling was more pronounced along the superior orbital margin, and encroached upon the forehead. For the last few days there was a deep-seated pain in the orbit, and great febrile action all through the night. It was decided to make an exploratory incision into the orbit, in hopes of finding an abscess and giving exit to the pus, the opinion still being held that it was an orbital cellulitis. After much demur the parents consented, and on March 3d the patient was etherized, and an incision, 1¼ inch long, was made along the orbital margin from the supraorbital groove outward, and about half an inch deep. This cut was made through a very dense, unyielding tissue, and did not open into the orbital cavity, so dense was the infiltration. The incision was then deepened until the bony edge of the orbital roof could be felt, and then a straight, sharp bistoury was thrust backward for about an inch, keeping the blade well away from the eyeball. Not a drop of pus was met with, and the tissues of the orbit were found densely infiltrated and converted into a brawny mass. The hemorrhage scarcely amounted to a few drops, and came almost entirely from the vessels of the skin. A small, irregularly quadrilateral piece of brawny tissue was removed from the orbit through the incision, and when washed, was of a dirty yellow color, absolutely bloodless, and very dense, like the thick rind of bacon.

The immediate result of the incision was a slight diminution of the orbital tension, so that the pain was less complained of, and the eye seemed a little more movable, but this effect was merely temporary. The pain returned, and the exophthalmus seemed to increase again after the closure of the wound, which occurred on the sixth day. On March 13th, the whole cornea became hazy, the infiltration spreading from the central ulcer. The latter had not perforated, but the pupil had become contracted and could not be dilated. On the 12th a purulent discharge began in the left ear, accompanied by severe pain in the ear and left side of the neck. The child cried almost constantly with pain in the eye and ear, had a high fever, pulse 140, and the mother said that he neither ate nor slept. On March 15th the cornea sloughed at the centre, and the iris and lens prolapsed in the opening. It was deemed advisable to enucleate the contents of the orbit at once, but this the parents refused to have done, and they withdrew the child from observation.

It was afterwards learned that the child lived several weeks longer, became very much emaciated, and died comatose. No autopsy was allowed.

The infiltrated tissue removed from the orbit through the long exploratory incision gave the usual reaction with iodine and sulphuric acid, turning brownish-red in spots on the addition of a watery solution of iodine, and changing into a dark blue, almost purple, when sulphuric acid was used.

The microscopical examination of the specimen was not entirely satisfactory, owing to the small amount of tissue at hand. After hardening in Müller's fluid and alcohol, sections were made, which showed in some isolated spots a luxuriant granulation tissue. There were very few vessels, and in those which existed the walls were very much hypertrophied, mainly at the expense of the calibre of the vessel, which in some could scarcely be distinguished. The infiltration seemed to involve not only the coats of the vessels, but to extend for a greater or less distance into the surrounding connective tissue. This condition of the orbital tissue plainly accounted for the small amount of hemorrhage. The infiltration had involved the walls of the blood-vessels, had narrowed their calibre, and eventually obliterated the vessels altogether. There was very little trace of either connective or adipose tissue, but the main mass seemed to be a homogeneous, structureless infiltration. From a clinical standpoint the morbid processes, without doubt, began in the orbital tissue, and

probably not far from the tarsal fascia and palpebral ligaments. The infiltration spread forward into the lid and up on the forehead as well as backward into the orbit, and the latter direction was not taken until after the disease had lasted for some time, for the exophthalmus was a comparatively late symptom. It would have been extremely interesting to have been able to follow the extension of the infiltration into the tissues of the lid, and note to what degree they were involved. The lid, towards the last, felt more like a piece of sole-leather than anything, so dense, unyielding, and homogeneous did it seem to be. Whether the perforation of the membrana tympani with the purulent otitis media had any connection with the orbital process, it is impossible to say, but it is probable that there was some such connection. The death of the child by coma preceded by other brain symptoms, points almost conclusively to an extension of the orbital process backward into the cavity of the skull, and in this way the ear may have become secondarily involved. It is very unfortunate that the history of the case could not be completed by a careful autopsy.

SYPHILITIC GUMMATA OF THE CONJUNCTIVA. By CHARLES STEDMAN BULL, M.D., New York.

GUMMY infiltration of the conjunctiva, whether circumscribed or diffuse, is probably the least common of all syphilitic lesions of that membrane. Gumma of the sclera, involving sometimes the fibrous capsule of the eyeball, is not an uncommon late symptom of syphilis; but gumma of the conjunctiva is certainly rare. Late manifestations of syphilis occurring in this neighborhood are rarely limited to the conjunctiva, but, beginning almost always in other tissues of the eyelids or eyeball, involve the mucous membrane by contiguity of structure. The following case of gummy infiltration of the conjunctiva with gummata of the sclera was under the author's care. The combination of constitutional syphilis with a certain group of symptoms that somewhat resembled scurvy, the general marasmus which existed, and, finally, the death from pneumonia, make up an interesting case.

Louis Budlow, æt. 56, native of Canada, and by occupation a laborer, was admitted to Charity Hospital, Blackwell's Island, August 11, 1877. The patient is a tall, robust man, but prematurely aged in appearance. Always healthy until the autumn of 1876, when he caught a severe cold, and was admitted to the hospital for simple bronchitis. At the end of ten days he was discharged cured, not having been confined to his bed for a single day. Remained well until the following summer, when he contracted a cough, and was readmitted to the hospital on August 11th. He had a dry cough, pain in the chest on both sides running through to the back, an elevated temperature and accelerated pulse, with all the physical signs denoting pleurisy, with slight effusion on both sides.

Fifteen years ago he had suffered from gonorrhœa, but positively denied ever having had the initial lesion of syphilis. Admitted to the ophthalmic ward of the hospital August 16, 1877. Two or three days before, he had felt a sensation of soreness in the left eye, and on the following day in the right eye. The pain became dull, burning, and continuous, and was located in the eyeballs. Whenever he swal-

lowed, whether solids or liquids, he felt a severe pain in the eyes, and this was immediately followed by marked blepharospasm.

Nothing particular about the man's general appearance, except a dull yellow complexion and a look of hopeless wretchedness. An examination of the abdomen and back showed the marks of an extensive old eruption, consisting of small white cicatrices, with deep brown pigmented margins, which have existed for twenty years. Upon the hands and face there was a peculiar eruption, composed of elevated spots with flat tops, some round, others oval, yellowish red in color, with a narrow dark red areola. They were neither painful nor tender to the touch, and presented a mid state between vesiculation and pustulation. On opening these a thin, watery pus mixed with blood could be pressed out. These vesicles or pustules were scarcely large enough to be called bullæ, and yet there was conveyed to the mind a general idea of pemphigus. One of the largest pustules was on the left upper lid, and there were two smaller ones along the ciliary margin. There were several on the face, and the remains of a large one on the bridge and right side of the nose. On the hands the eruption was almost entirely on the dorsal surface, and was grouped around the knuckles and between the fingers. Some vesicles on being opened gave exit only to blood.

The eyes were almost identical in appearance. Surrounding the corneæ there was a growth, most marked on the outer and lower sides, varying in height from one and a half to two lines, seated in and beneath the ocular conjunctiva. This growth extended away from the cornea on all sides about one-third of an inch, was pale yellow in color, moderately hard to the touch, with an irregular, knobby surface, and apparently destitute of vessels. The conjunctiva was firmly adherent to this growth, and the cornea was embedded in this wall like a watch-crystal in its frame. On being incised it cut like brawn, and the hemorrhage was very slight. Upon the sclera of each eye, between the tendons of the superior rectus and external rectus muscles, and partially covering the latter, was an extensive and extremely well-marked gummy infiltration of the sclera, very vascular, very tender to the touch, and especially painful when the eyes were turned outward. This infiltration extended backward symmetrically in the two eyes, but was somewhat more extensive in the right eye. The media were clear, and an ophthalmoscopic examination revealed nothing abnormal. The patient's breath was fetid, the buccal mucous membrane very pale, and bore the marks of the teeth along the cheek. Tongue moist and thinly coated; appe-

tite poor; bowels obstinately constipated. Temperature 100¼; pulse 102; intellect dull, answered questions very slowly. Physical signs of pneumonia well-marked over both lungs. A diagnosis was made of syphilitic pemphigus, gummy tumor of the sclera, and pericorneal gummy infiltration of the conjunctiva, and double pleuropneumonia. The patient's condition was very bad, and a vigorous tonic and restorative treatment, combined with mercurial inunction and potass. iodid., was at once instituted. Quinine, dilute sulphuric acid and iron were regularly administered, potass. iodid. grs. xx. ter die, and the inunction night and morning, and a liberal diet of milk, eggs, beef-tea, and eight ounces of whiskey daily.

August 25th.—The patient grew slowly worse, with occasional delirium, and in the intervals of the delirium the stupor slowly deepening. The dose of potass. iodid. increased to grs. xxx. Diminution of conjunctival infiltration!

August 26th.—Integument dusky, breath very fetid, gums spongy and bleeding. Urine is turbid, sp. gr. 1015, contains a trace of albumen, some pus-corpuscles, and a large number of triple phosphate crystals. Spots on the hands are growing larger and approaching bullæ in appearance. Skin very dry and hot. A swelling has made its appearance over the inner condyle of the right arm, painful on pressure. This swelling soon extended down the right forearm, pitted on pressure, and was doughy to the touch. The right hand, both legs and feet, œdematous.

August 27th.—Painful diarrhœa, attended by tenesmus, rumbling and bloody discharges. Face puffy; repeated bleeding from the gums and nose. Patient is semi-comatose. Consolidation now detected at apices of both lungs, with some friction-sounds on left side. *The scleral growths and the pericorneal conjunctival infiltration have almost entirely disappeared.* The spots on the hands and face are increasing in size and becoming more red in color.

August 29th.—Diarrhœa ceased; mercury discontinued. Transferred to pavilion on account of delirium. Right cheek swollen, especially near angle of mouth, and a spot of ulceration on buccal surface, opposite the first molar tooth in the upper jaw. Right forearm red, hot, and tense.

August 31st.—Right cheek swollen enormously, eruption decidedly hemorrhagic.

September 3d.—Incisions in right forearm necessary to relieve tension—considerable pus discharged through the incision, and patient much relieved. Swelling of right cheek still more marked, and at

one point on mucous surface a somewhat extensive black slough. *Eyes entirely well.*

September 6th.—Constant delirium; slough in cheek extending; eruption drying up. Arm doing very well, scarcely any febrile action.

September 16th.—Large hole sloughed through the entire thickness of the cheek. Delirium has turned to coma. Steady improvement in the arm.

September 19th.—Death at 4 P.M. in deep coma.

Autopsy, twenty and a half hours after death. Body emaciated. On back of hands a number of bluish red spots, varying in size from a three-cent piece to a dime. Beneath the right malar bone is a round, clean-cut ulceration of all the tissues of the cheek, which extends to the angle of the mouth, but does not involve it. All the tissues involved in the ulceration form a soft, pulpy, brownish red, offensive mass. Right half of the tongue destroyed by ulceration. Right half of inferior maxilla, from symphysis to angle, is denuded of periosteum and bare, and the same condition exists in the right superior maxilla.

Calvarium unusually thin. Dura mater normal. Increased amount of cerebro-spinal fluid. Pia mater œdematous, sinuses empty, vessels at base of brain normal. At posterior portion of right hemisphere is a spot of softening about an inch in diameter, breaking down immediately on section.

The *thoracic cavity* contained about ten ounces of clear serous effusion—on the right side a few bands of adhesion at the apex—on the left side a few bands of adhesion at the base to diaphragm. Upper lobe, central portion of middle lobe, and greater portion of lower lobe of right lung in stage of gray hepatization, associated with emphysema. In left lung, entire lower lobe the seat of catarrhal pneumonia passing into the gray stage—upper lobe emphysematous and œdematous.

Heart.—Both ventricles hypertrophied and dilated; on leaflets of aortic valves some soft vegetations; in pericardial cavity about half an ounce of clear serous effusion.

Abdomen.—Liver fatty; capsule of spleen thickened, and its parenchyma almost diffluent. In cortex of kidneys several small abscesses, size of a split pea; in both pyramidal and cortical portions are evidences of chronic interstitial nephritis. Pelves and ureters contain a small amount of pus.

Intestines normal, except a few chronic ulcerations in the cæcum.

Situated in the median line of the neck, below and between the

lateral lobes of the thyroid gland, is a tumor as large as an English walnut, just beneath the subcutaneous fascia. It is soft and fluctuating, and found filled with disintegrated coagulæ. On the internal surface of its walls were a few calcareous plates. Pharynx and trachea normal.

The points of interest in the case are:

1. The rarity of the pericorneal and conjunctival growth.

2. Its coincidence with, and yet independence of the gummy infiltration of the sclera.

3. The cyst in the neck, with its disintegrated contents, unrecognized before death.

4. The vesiculo-pustular eruption, becoming pemphigoid and subsequently hemorrhagic.

5. The hemorrhagic diathesis as shown in the various symptoms.

Of course, gummy infiltration of the sclera and episcleral tissue is a common enough manifestation of constitutional syphilis, and the scleral gummata in this case occupied the usual site in the neighborhood of the external rectus muscle. Though the infiltration was extensive, this is not uncommon, and it spread in the usual direction from before backward, toward and beyond the equator of the eyeball. Furthermore, it was binocular and symmetrical, as is usually the case in syphilitic lesions of the eye. As regards the conjunctival gummata in this case, no ulceration occurred. Their appearance at first, and their mode of growth, resembled very much the description given by *Smee* of his case. They began as a dirty discoloration in small patches in the conjunctiva around the cornea, with at first scarcely any elevation. These patches then coalesced, gained in thickness and breadth, and thus formed the wall around the cornea. They then remained unchanged until the system came under the influence of the mercury, and then, in spite of the patient's generally depraved physical condition, they rapidly subsided and disappeared before the scleral infiltration was absorbed. The conjunctiva and sclera were normal in appearance between this circum-corneal wall and the gummy tumor of the sclera, near the external rectus muscle. There was no increased vascularity of the eyeball, except in the immediate neighborhood of the latter. The symmetrical arrangement of the double infiltration in the two eyes, and what might be alled their symmetrical independence, was of considerable interest.

A third point of interest was the cyst in front of the trachea, the xistence of which had not been recognized before death. This cyst

had no connection with the thyroid body or trachea, and had probably existed for some time, perhaps years, if we may judge from the presence of the calcareous plates upon the inner surface of its walls. The exact pathology of the cyst it is very difficult to determine. There were no signs of interference in the function of either trachea or œsophagus during life, so that its rate of growth is unknown. In view of the constitutional syphilis, its origin had been probably a gummy deposit in the subcutaneous tissue of the neck, just below the isthmus of the thyroid and in front of the trachea, which had subsequently undergone retrograde metamorphosis. Its contents found at the autopsy were regarded as disintegrated clots, but the presence of the blood may be accounted for by the marked hemorrhagic diathesis. The wall of the cyst varied in thickness from three to five lines, its inner surface was smooth, as if covered by a membrane, except where the calcareous plates were situated, and the outer surface rough, owing to adhesions to the surrounding tissues. Microscopic sections showed that there was no distinct lining membrane, nor any trace of epithelium, and the smooth appearance of the inner surface was probably the result of pressure of the contents. The wall was composed of a large number of layers of fibro-areolar tissue, with some cells, fusiform and round, with nucleus and granular contents. These layers of fibres were packed very closely together, forming a dense, strong wall, which had probably originated in the following way. A gummy deposit had occurred in the subcutaneous areolar tissue, which by its presence had set up a localized inflammation, lymph was poured out around the gumma, became organized, and thus the growth went on. At some subsequent period the contents of the tumor began to break down, disintegrated and perhaps suppurated, and at this stage the hemorrhage may have occurred and mingled with the contents. As the process of absorption went on, these bloody extravasations probably recurred again and again, and thus the cyst-wall had no opportunity of collapsing, and hence no obliteration of the cavity occurred.

The accompanying eruption was another interesting feature in the case. Its ill-defined, nondescript character was at first unsatisfactory. The spots were as often pustules as vesicles; and even when more truly vesicular, the surrounding areola was different from that usually seen in this variety of eruption. Only in a few of the spots was the areola at all well marked, and the vesicles were not large enough to speak of them as bullæ until towards the close of life. The ill-defined character of the eruption was no doubt the sign of de-

fective development, due to the extremely low, marasmic state of the man's system. As a rule, patients with pemphigus die of marasmus, and very often from pulmonary tubercles or pneumonia. In many cases we also find at the autopsy amyloid degeneration of the liver, spleen, and kidneys, with chronic interstitial desquamative nephritis. The locality of the eruption was also somewhat singular. According to authorities, the favorite place for pemphigus is on the palm of the hand and sole of the foot, on the scalp and brow. But in this case the eruption was on the face below the forehead, and on the dorsum of the hands and fingers. The scars on the back and abdomen might point to a papular or tubercular eruption. As a rule, scars do not give any absolutely characteristic sign by which to recognize the preceding destructive process, though we are sometimes assisted by them in coming to a conclusion as to the nature of the lesion.

The final point of interest was the hemorrhagic diathesis, as shown by the tendency to bleed from mucous and cutaneous surfaces on slight provocation, and towards the end spontaneously. The buccal mucous membrane and tongue were almost bloodless, and the patient had frequently had epistaxis. Subsequently his gums became spongy and bled easily. A bloody diarrhœa made its appearance and was with difficulty controlled, recurring again and again towards the end. The eruption became hemorrhagic, and even at first the contents of the vesicles or pustules was in part blood. As the vesicles became bullæ, the hemorrhagic tendency was still more clearly developed.

A CASE OF SPONTANEOUS CURE OF SUBRETINAL EFFUSION. By DAVID WEBSTER, M.D., of New York.

AT the eleventh annual meeting of this society I reported "a case of spontaneous cure of subretinal effusion" which occurred while the patient kept the supine position for a period of ten days. I have now a similar case to report. This case, like the former, occurred in the private practice of Dr. C. R. Agnew, and was carefully observed by him as well as by myself.

April 8, 1876.—W. B. H., æt. 47, clerk, has been very near-sighted, in both eyes, all his life. A week ago he first noticed a dark spot over his right eye. This dark spot gradually increased in size until now there remains only sufficient vision to count fingers at a distance of one foot, and that only in the extreme infero-nasal periphery of the visual field. Ophthalmoscopic examination shows detachment of the retina.

The left eye has never been of much use to the patient. It is myopic over one-half, and has vision less than $\frac{1}{200}$. Inspection shows that it is the subject of corneal and lenticular opacities, with very extensive staphyloma posticum.

A trial of the supine position was advised.

May 16.—The patient states that he went home and lay on his back twenty-three days, in a moderated light. He has vision $\frac{10}{200}$ with his spectacles, and he feels that his sight is improving every day. No separation of the retina can now be seen, but in the vitreous are some floating bodies.

April 8, 1878.—It is now just two years since we first saw Mr. H. His right eye now has vision $\frac{20}{100}$ with $-\frac{1}{24}$, which he wears all the time. The visual field is complete. There are still some floating bodies in the vitreous, and large staphyloma posticum.

Mr. H. gives the following history of his recovery: he had no drops put into his eyes, nor were they bandaged when he lay on his back. After he lay on his back two or three days, everything looked of a beautiful *purple* color. After that an appearance like steam came over his eye, and that kept growing clearer and clearer all the

time, and the last few days there was a little black spot which kept going round and round like a pin-wheel, and growing smaller and smaller until it finally disappeared. After he got up everything was clear, but of a kind of a *greenish* cast. This greenish tinge lasted for a week, and then disappeared. Vision has improved ever since, and he believes it to be better now than before the detachment. He has been engaged in his business as clerk for the last seven months.

DR. PROUT remarked that in the treatment of subretinal effusion the prolonged recumbent position, as proposed by Samelsohn in 1875, is to a certain extent illogical, and in very many cases perturbating. Every one has noticed that cataract patients are sometimes injuriously affected by the necessary confinement to bed after extraction. A patient with a felon on his finger will not allow it to hang down, nor find the greatest degree of comfort for it in the horizontal position; he will carry the hand so that the blood may easiest run *from* the affected part. The quiet lying in bed keeps the blood in the head and *about* the orbit, even if it is assumed that the intraocular blood-pressure remains unchanged, which the speaker by no means admits. Why is it that in seriously inflamed eyes and after operations it is necessary to forbid mastication?

The subretinal fluid tends to gravitate to the lowest part of the eye. Rest in bed on the back, therefore, would maintain the separation where its injurious effects are greatest. Could the patient lie prone the fluid would tend to gravitate to the ciliary region, where the blood-supply, and consequently, we may assume, the absorbent power are greatest, and his chances of recovery would be improved.

But the real curative agent is *rest*, as nearly absolute functionally and mechanically as possible, and to obtain this great good the smaller evil of the faulty position must be tolerated, unless we can find a substitute. Very few patients will, while allowed to move about, keep the head and eyes at rest. Hence the necessity for the quiet rest in bed. I will illustrate this by a case. J. W. P., aged about 60, before coming to me had already tried for more than two weeks the recumbent position. The effect on the eye was beneficial, and being a man of robust health and excitable temperament, the bed had become excessively irksome to him. The visual field was lost except to the outer side. Still, as nothing else promised any relief—the other eye had been lost twelve years before —he wished to try this mode of treatment again. He was told that functional and mechanical *rest* was the one thing needful, that the disturbing in-

fluence of lying in bed was prejudicial, and that rest could be obtained without its being necessary to keep the horizontal position constantly. He could bandage his eye and sit up every day, taking great care to avoid sudden movements, etc. He went home, sat in an easy rocking-chair, which put his body at an angle of about forty-five degrees with the horizon, and went to sleep expecting to commence the bed-and-rest treatment on retiring that evening. He slept from two to six P.M., and on waking was astonished to find a very nearly complete restoration of the visual field, with, however, quite dim vision. In order to avoid any motion he continued in the chair all night, going to bed next morning. Nearly every day he sat up in the chair, avoiding quick movements of the body and keeping his head as still as possible. He could not stay all day in bed with any comfort, and it was clear that to attempt to maintain absolute quiet would very much injure his general health. This course was maintained for about three weeks, when he was allowed to go out for exercise.

The condition of the retina has not improved; the visual field is of very nearly normal extent, but vision continues very bad.

NOTE.—As a final effort, local depletion, which before did good, but the improvement did not persist, was again resorted to, by means of Heurteloup's artificial leech, but with injurious result.

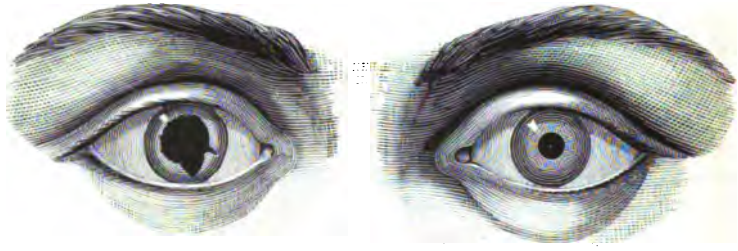
A CASE OF MULTIPLE RUPTURE OF THE CIRCULUS IRIDIS MINOR, WITHOUT OTHER INJURY TO THE EYEBALL.

By Dr. J. J. B. Vermyne, New Bedford, Mass.

Uncomplicated rupture of the sphincter pupillæ seems to be of such rare occurrence, that I feel justified in reporting the following case:

On the 11th of February, 1877, I was called to see Mr. E. P., of New Bedford, who on the morning of that day had received an injury to his right eye. While trying to turn off a banjo-rim, composed of pieces of differently colored wood strongly glued together, after some few turns of the lathe the gouge caught in the wood, with the result that the rim was broken in several pieces, large and small, one of which struck him with considerable force across the nose and the right eyebrow, knocking him over. At the time of the injury there appeared a bright light, there was some pain around the eye, a few drops of blood from a cut on the nose, subsequently sensitiveness for light and a blurred appearance of objects. After two or three hours there was considerable pain in the eye and the head, for which he made cold applications, but finding no relief, he sent for me. Being absent from the city, another physician was called, who gave a quieting draught and made some application to the eye, requesting at the same time to send for me on my return. I saw the patient at 8 P.M. He was a healthy-looking young man of eighteen. He told me that after taking his draught he had gone to sleep, had slept almost the whole afternoon and felt greatly relieved, there being hardly any pain in the eye or the head. On removing the bandage from his right eye, I found a widely dilated pupil, somewhat notched on the inner and lower part, a little below the horizontal meridian. There was some hemorrhage in the anterior chamber, covering the lower margin of the pupil. The vision, according to patient's statement, was blurred, otherwise slightly affected, and as he complained of the strong light, I postponed further examination, under the belief that the physician who first saw him had applied belladonna. Before visiting my patient the next morning, this physician told me that he had prescribed an infusio belladonnæ, in case the pain should not subside before my return, but had not applied any

himself. My patient was walking about the room, complaining only that the light hurt him. On making inquiries I found that the infusion of belladonna leaves had not been applied, as the pain subsided very soon after taking his quieting medicine. On examining the eye with focal light and ophthalmoscope, there was slight conjunctival injection, hemorrhage in the anterior chamber still covering the lower margin of the pupil, which has the size of paralysis and is somewhat irregular in its margin. A cursory examination of the vision of this eye shows that it is slightly blurred for small objects, especially at short distance. Behind the iris the media are perfectly clear. There is a little abrasion of the skin on the eyebrow and a small cut on the nose. No more pain in eye or head. I considered his case one of mydriasis from shock, and continued cold applications, alternating with compressory bandage. The patient was seen again two days after, when the blood in the anterior chamber had entirely disappeared, and the lower part of the iris, now visible, presents the following appearance: a little inside of the vertical meridian there is a downward coloboma, at its wider upper part about the size of the pupil of the other eye. It extends nearly to the junction with the cornea, where there is a small rim of iris-tissue left. Presenting somewhat a triangular shape with rounded angles, it has, with the superposed dilated pupil, a pear-form appearance. In the lower



tapering part can be seen some small shreds of iris-tissue, like fine threads. A little above the nasal end of the coloboma is a small linear rent in the pupillary margin, and following this margin from the outer end of the coloboma it is notched or scolloped for about one-fourth of its circumference; altogether there is about two-thirds of the pupillary margin involved; the dilatation persists. All other parts of the eye appear to be perfectly normal. With favorable illumination the lower margin of the lens with the zonula Zinnii can be distinctly seen through the coloboma. The examination of V.

showed E. for both eyes. O. S. V. = $\frac{1}{1}\frac{5}{5}$. O. D. V. = $\frac{1}{4}\frac{5}{0}$, improved by stenopæic apparatus to $\frac{1}{3}\frac{5}{0}$ and some letters of XX. Nearest point for O. S. Snellen $1\frac{1}{2}$ at $3\frac{1}{2}$ inches, O. D. the same at 8 inches, again improved to $6\frac{1}{2}$ inches by the stenopæic slit. There seems to be some contraction of the pupil when strong light is used. For the same degree of illumination the dimensions of the pupil are for O. S. $\frac{1}{8}$ inch, for O. D. horizontal diameter $\frac{1}{4}$ inch, vertical to the termination of the coloboma, nearly $\frac{3}{8}$ inch, width of the gap in the pupillary margin at upper part of the coloboma nearly $\frac{1}{8}$ inch. Calabar-bean was applied, first in the form of gelatine, afterwards as one per cent. solut. of sulphate of eserine, but, though temporarily improving the condition of the pupil, without permanent effect. I had some fears in regard to the usefulness of the injured eye. But I saw the patient repeatedly afterward, the last time only two weeks ago, and although the appearance is still the same, the near point of O. D. has approached to 5 inches; there is distinct reaction of the pupil, and when coming suddenly in a bright atmosphere, his vision is confused for a very little while, but this soon leaves him. He uses both eyes in reading and writing, distance about 10 inches.

The literature on diseases of the eye, so far as I could consult it, does not give many cases of rupture of the sphincter pupillæ, and almost unexceptionally it is called a rare injury. Lawson on Injuries of the Eye, page 127, under the head of "lacerations of the iris without rupture of the external coats of the eye," says: "I refer now to those *rare* cases of injury in which the structure of the iris is torn by a blow on the eye, but without any rupture of the sclerotic or choroid. From a sharp blow I have seen the pupil present the appearance as if it had been notched, a small tear having been made by it through the pupillary margin of the iris, and yet there was no laceration of the external coats of the eye, nor wound of the lens." He reports the case observed by Critchett, where the rent in the iris was so shaped as to form a second pupil above the normal one, separated from the latter by a small bridge of iris-tissue, and not encroaching on the ciliary attachment.

Zander u. Geissler, in *Verletzungen des Auges*, p. 349, say: "As far as we know, isolated rupture of the circulus iridis minor has only been described by White Cooper." They quote the history of four cases observed by the latter, in all of which dilatation of the pupil remained permanent, and all of them producing a considerable trouble in the use of the eye for close distance.

Wharton Jones, p. 427: "When the iris is torn across there is

produced a state resembling coloboma iridis." He reports no cases.

Seitz-Zehender, *Handbuch d. Augenheilkunde*, p. 305, observes that lacerations in the continuity of the iris-tissue, in consequence of a mechanical force, are very rare; much more frequent is the separation of the peripherical margin of the iris from the ciliary muscle.

In Stellwag v. Carion's *Handbuch d. Augenheilkunde*, I only found an allusion to real separation in the continuity of the iris, whether accidental or caused by operations, as a cause of iritis.

In the fourth volume of Graefe-Saemisch *Handbuch der gesammten Augenheilkunde*, de Wecker says (p. 536): "An exceedingly rare injury, caused by contusion of the eye, is the laceration of the pupillary margin of the iris, such as has been observed by White Cooper, and of which I have observed two cases." In both of these cases there was, however, no permanent mydriasis, and the pupil showed after the injury the pear-form which is commonly observed after iridotomy.

Soelberg Wells (p. 177) speaks of the injury as very rare, and quotes the cases of Cooper and de Wecker.

Meyhoefer, of Gorlitz, publishes a case of quadruple laceration of the pupillary margin in *Klinische Monatsblätter f. Augenheilk.*, February, 1877. He calls attention to the exceedingly rare occurrence of the injury, only quoting the cases of Cooper. In this case the rupture of the pupillary margin was complicated with an extensive rupture of the choroid. The patient regained almost normal vision; the pupil remained the size of paralytic mydriasis.

In the fifth volume of the same journal, page 160 (year 1867), is another case, reported by Dohmen. The rupture appeared as coloboma, extending to the ciliary margin, and a piece nearly one-eighth of the iris was wanting, and was seen fourteen days later downward and inward, deep in the vitreous. In addition there was outward and downward dislocation of the lens, and separation and rupture of the retina.

In von Graefe's *Archiv für Ophthalmologie* there are two cases reported under the head of laceration of the iris. The first one, reported by von Graefe in Vol. I., Part I., p. 405, was a case of wound of the sclera near cornea, with prolapse of a portion of iris. The second case, reported in Vol. II., Part II., p. 161, by D. E. Müller, of Oldenburg, was that of a man of seventy, who had received a blow on the eye thirty years before, and seen indistinctly with it since. A

stick of wood struck the same eye some months before he presented himself. The iris was ruptured in three places and bent inward; the lens had lost little of its transparency, but was movable, and now in front of, now behind the iris, according to the position of the body. The first of these cases does, therefore, not belong to rupture of the circulus iridis proper; the second case is doubtful in this regard.

Rheindorf, Schweigger, and Carter make no mention at all of the injury in their handbooks, although they speak of separation of the ciliary attachment (dialysis), of an inward bending of the iris, and of mydriasis as consequences of injury to the eyeball.

A *résumé* of the preceding shows, therefore, only the cases of White Cooper and de Wecker, that of Meyhoefer and of Dohmen, the two latter complicated with rupture of the choroid or of the retina; and these cases are quoted generally with the assertion that the injury is very rare.

Against this assertion, however, stands the following in *Klinische Beobachtungen aus der Augenheilanstalt von* Dr. J. Hirschberg, 1874, p. 38: "The protracted duration of mydriasis is evidently caused by changes in the uveal tract. Their most simple form is that of rupture of the sphincter, and on careful examination this is found oftener, as would be expected from the observations of White Cooper, de Wecker, and others."

This remark was an additional incentive for reporting my case, the more since, through the kindness of Drs. Williams and Wadsworth, of Boston, I am enabled to mention two more cases.

Dr. Williams had seen one case, but had not taken any notes; but as the case had happened but a short time before he related it to me, he could remember it perfectly well. There was no injury of any important part, except abrasion of the cornea and rupture of the sphincter pupillæ. He believed that the man recovered fair vision in a few days and discontinued attendance.

Dr. Wadsworth saw one case, about six years ago, in a boy of eleven, struck on the right eye by a stone two days before he saw him, in January, 1872. The lids were somewhat swollen after the blow, and both were considerably ecchymosed. Pain in brow the night after injury, not afterward. Some conjunctival congestion, cornea clear, slight turbidity of aqueous from blood, and a clot at the bottom of anterior chamber. Iris shows no change of color, sphincter iridis ruptured in five places, pupil size of paralysis; floating webby opacity in lower part of vitreous; lens clear; veins of retina apparently full, but like those of the other eye, and the whole of fundus

having a little reddish gray tinge, perhaps from effect of hemorrhage in the media. V. about $\frac{1}{100}$. Two days later clot in anterior chamber mostly absorbed; V. = $\frac{1}{20}$. Soon after V. gradually diminished; six months after, general opacity of the lens, and a more dense, cup-shaped opacity of the posterior cortical. No details of fundus to be seen; apparently no defect of field. After the lens became more opaque discission was performed, but vision remained poor, and there were many webs of opacity in the vitreous.

In how far, in the case reported, the permanent mydriasis can be ascribed to concussion of the eye, as de Wecker thinks of White Cooper's cases, or whether the extent of the rupture, which, though presenting the pear-shape after iridotomy, extends over nearly two-thirds of the pupillary margin, is the cause, I must leave undecided. However, as there is now, eighteen months after the accident, a visible contraction of the pupil on strong light, and yet the mydriasis still persists, I feel inclined to the belief that the latter is the case.

TUMOR OF THE CONJUNCTIVA, SIMULATING CYST.

By Dr. Richard H. Derby, New York.

Mary E. T., aged 9, first came under observation January 29, 1878. Patient, a strong, healthy child, for some weeks had suffered from granular eyelids. Tannin in substance, alternating with sulphate of copper, was used with advantage locally. When the patient was first seen the following peculiar condition was noticed: upon eversion of the left upper lid, and directing the patient to roll the eyes down, a new growth, in or beneath the ocular conjunctiva, extending from a line in front of the fold of transmission and along its inner third, downward and inward until it was lost in the tissues about the caruncle. Its lower margin was clearly defined about three lines distant from the corneal margin. The body of the new growth, movable upon the eyeball, was semi-transparent, prominent, at its outer limit flattened. When directed to look at an object held in the horizontal plane before the eyes, the lower margin of the new growth was seen between the eyelids. At first no great inconvenience was

having a little reddish gray tinge, perhaps from effect of hemorr[illegible] in the media. V. without $\frac{15}{200}$. Two days later clot in anter[illegible] ber greatly diminished: V. = $\frac{1}{20}$. Soon after V. gradually diminis[illegible] six months after, general opacity of the lens, and a more dense[illegible] shaped opacity of the posterior cortex. No details of fundus [illegible] seen; apparently no defect of field. After the lens became [illegible] opaque discission was performed, but vision remained poo[illegible] there were numerous spots of opacity in the vitreous.

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J.S. SHARP. PINXT.

experienced from the tumor; gradually the new growth became more apparent to the patient and her friends, and it was decided to attempt its removal April 27th. Under ether the upper lid was everted and the eye rolled downward as far as possible. An incision was now made along the upper margin of the tumor through a much thickened conjunctiva, and this incision was met by another carried along the lower margin of the new growth. Everywhere a very much thickened conjunctival membrane was encountered. At its central, most prominent part, there was a cavity, containing no fluid.

The wounds thus made by the operation were closed by sutures, and now, in November, 1878, there has been no return of the new growth.

Dr. C. S. Bull, to whom a specimen of the tumor was given, writes as follows:

"I have just finished looking at the specimen of conjunctival or subconjunctival growth which you referred to me some weeks ago. In the small piece of apparent wall of the cavity which was removed I could find no trace of any epithelial lining. It seemed to be made up of connective-tissue fibres and hypertrophied conjunctival tissue. The small piece from the inside consisted only of adipose and connective tissue. There was no cell-growth of any kind."

CASES OF SARCOMA OF CHOROID AND RETINITIS ALBUMINURICA. By Dr. Lewis S. Dixon, Worcester, Mass.

SARCOMA OF CHOROID.

Michael Dunn, a healthy man of fifty, reported that he had been troubled for the preceding two months by severe neuralgic pain in his left eye, and had found no relief from the physicians he had consulted. Vision was $\frac{20}{20}$ and the external appearance was normal, with the exception of a slight circum-corneal injection on the outer edge of the cornea, with some tenderness on pressure over that region. No photophobia, tension same as other eye, and the ophthalmoscope gave no view of anything abnormal within the eye. Atropia was advised and a stimulating lotion given to bathe about the eye. Further and repeated examinations gave no more indication as to the cause of the persistent pain. All sorts of remedies and means were tried without relief. Opiates, chloral, etc., caused so much disturbance of the stomach and head, that they were refused. Tonics seemed powerless and the pain increased steadily. Vision now began to fail, apparently from haziness of the vitreous. Patient was sent to Boston for advice, and iridectomy was suggested as most likely to prove of service, but nothing definite as to the causation was ascertained. The operation was done, and gave some relief for a few days only. After further ineffectual treatment, he went to the infirmary in Boston, and was seen by several of the gentlemen there, but no diagnosis was made; and though the media were moderately clear, no tumor was discovered at any time, yet something of that nature may have been suspected. Enucleation was advised, but not consented to. Vision now failed rapidly until *light* was not perceptible, and pain became so excessive that the patient was nearly crazy. The eye was at last removed, with immediate and entire relief to pain. Health and strength returned rapidly, and in a few weeks he was at work. Examination of the eyeball showed a flat tumor or thickening, occupying one-third of the circumference of the ciliary region, on the outer side of the cornea. This tumor was about $\frac{1}{12}$ of an inch thick at its thickest part, and sloped gradually from the centre on all sides until lost in the natural tissues. The retina was

completely separated, but not involved in the growth, which affected only the ciliary body and the choroid slightly. The sclerotic was somewhat thinned over the tumor. It was examined microscopically by Dr. Wm. H. Workman, who found it to be a round-celled pigmented sarcoma. Six months later he noticed a slight redness at the same relative position on the other side of the right cornea, with occasional twinges of pain. These became more and more frequent, appetite began to fail, and all went on just as before. With the widest dilatation nothing could be seen but a few rather large blood-vessels at the point of tenderness over the ciliary region. Vision remained $\frac{20}{20}$ for some time. For five months the patient grew steadily worse, entirely discouraged, and refusing to take any care of himself. Excessive pain wore out his life. He kept his bed for the last three weeks, but had his senses perfectly till death, and seemed free from any other ailment. Both eyes became troublesome about the same time of year, and he died just one year from the day of the first enucleation. Not being notified of the patient's death until after his burial, it was impossible to obtain the second eye for comparison; although the whole course of the right eye resembled so closely that of the left, that it is quite likely the condition was identical.

RETINITIS ALBUMINURICA.

Patient was a strong, active man of forty-five. He had noticed for a month a slight blurring in the left eye, and almost by chance, stepped in to ask about it. Externally the eyes were in good condition; vision was $\frac{20}{20}$ with the right, and $\frac{10}{20}$ with the left eye. The opthalmoscope brought to view in both eyes a singularly complete and brilliant example of that form of retinitis which accompanies Bright's disease, the peculiar splashed or stellate appearance being abundant and marked, the splashes sharply defined and of a metallic, silvery white. On the most careful questioning the patient seemed to be entirely free from any of the symptoms of Bright's disease, except that occasionally he needed to urinate during the night, and sometimes had headache. He was strong and hearty, and did "the work of two men." On examination of the urine, neither heat nor nitric acid gave anything but the faintest indication of albumen, though the carbolic and acetic acid test gave a more decided result. The microscopic examination, though careful, and repeated with eight or ten slides, gave nothing that could reasonably be considered casts. Being shaken in my confidence as to the diagnosis, I nearly filled a

long pipette with the urine drawn from the bottom of the conical glass, which had been settling for about eighteen hours; this was corked at the top and hung up vertically over night. Then on warming the air at the top of the tube with the fingers, the very bottom drop was received on a slide and examined, with the result of finding abundant hyaline and granular casts. The patient was sent, with a note, to his physician, who, after examining the casts already found, was reluctantly convinced of the truth of the diagnosis, and took charge of the case, advising the patient to settle up his business affairs and travel for his health. Four months later he returned, feeling that we must have been mistaken, his health being perfect and vision normal in both eyes. There was at this time considerable albumen in the urine, and casts were easily found. The ophthalmoscope still enabled one to see the distinct and brilliant display of albuminuric retinitis, the splashes resembling frosted silver-work, and quite covering the fundus for a distance of three or four lines from the disc. He continued his work as usual, and in excellent health and appearance for about eight months longer. He was then taken suddenly ill with convulsions and hemorrhages from various parts of his body, and died in a couple of weeks. No autopsy was allowed, but all the symptoms were decidedly those of the small contracted kidney. In this case, the retinal trouble was therefore the only, and yet a very decided symptom, that led to the diagnosis of Bright's disease before his illness; and the almost total absence of albumen and casts at first, would indicate that great care should be taken in examining suspected urine, before we pronounce it free from trouble.

INTRAOCULAR CIRCULATION: RHYTHMICAL CHANGES IN THE VENOUS PULSE OF THE OPTIC DISK.

By Dr. O. F. Wadsworth and Dr. J. J. Putnam, of Boston.

The investigation to be described in this paper was undertaken by us originally for the purpose of studying for ourselves the effects of compression of the veins and arteries of the neck and of inhalation of amyl nitrite on the retinal circulation. It is published, however, mainly for the sake of the observations whose nature is indicated in the title of the paper, and our results as regards the other points, which have so often been the subject of controversy, will be only briefly noted.

The method of experimentation was always the same—one of us always examining, by the upright method, the same eye of the other, the pupil fully dilated with atropine. To further fix the appearances, a careful sketch of the disk and vessels was made.

It was soon found that the best point on which to fix attention was a main branch of the vena centralis, which pulsated distinctly as it turned to plunge into the physiological depression near the centre of the disk, receiving at its bend a smaller branch, which also pulsated. Changes in the size and shape of the pulsating portion of these vessels formed the most obvious, indeed the only reliable signs of variation in the vascular supply to the fundus. No *pulsation* was ever seen in the other veins of the fundus, and only during the experiments with amyl nitrite were any changes in their size observed. At no time could any general change in the coloration of the disk be made out.

1. *Compression of the jugular veins.* This was done by twisting a handkerchief about the neck. The compression could easily be carried so far as to cause the veins to stand out in relief on the forehead, and the whole face to assume a dusky hue, not to speak of causing blurred vision and an uncomfortable sense of fulness in the head. The effect of this procedure on the intraocular circulation was, however, so slight, if there was indeed any, as not to be made out with certainty. Sometimes an appearance of greater fulness of the vein at the pulsating point seemed to be present, but the pulsations went on as before.

2. The effects of *pressure on the carotid* of the same side with the eye examined, were studied in the following manner: the pressure was made at about one and a half inches above the clavicle by one finger of the examiner, and was increased to a degree sufficient both to stop the beating of the temporal artery, and to cause a distinct sensation in the head, quite different, it may be said, from that due to compression of the jugular veins. So soon as this result was produced, all pulsation in the veins ceased abruptly, and the vein remained narrow, as in the condition of so-called venous systole, so long as the pressure was kept up.

Immediately on relaxation of the pressure on the carotid the veins refilled completely, and the normal pulsation was re-established.

This observation seemed to us to have an important bearing on the theory of the venous pulse. It is well known that two prominent theories with regard to this phenomenon are held: one, that of Coccius, who maintained that at the time of arterial diastole the blood flowed out of the eye, through the veins, more rapidly than before, the veins at the same time becoming narrower near their point of exit; the other that of Donders, according to which, at the time of arterial diastole, the vein at its point of exit is compressed, which causes a backing-up of the blood just behind this point.

The latter view is the one which appears supported by the results of the experiments just described. Here the pressure on the carotid prevented the arterial diastole, and so long as the pressure was kept up, that part of the vein which normally pulsated remained in a semi-collapsed condition, *i. e.*, in the condition of so-called venous systole. So soon, however, as the pressure was removed, and the heart's impulse again allowed to distend the artery, this portion of the vein refilled, entering into the condition of venous diastole, and then the pulsation went on as before.

3. *Inhalation of amyl nitrite.*—The first result of two or three full inhalations of this drug, poured upon a handkerchief, was that at once, even before the full sensorial effect had developed itself, the vein at the pulsating point became reduced in size as it had done when pressure was made on the carotid; the pulsation did not however, as in that case, cease altogether, but became rapid and sometimes imperceptible, always slight. No change could be detected in the appearance of the arteries at this stage, nor of the veins except at the point referred to.

As a secondary result of the inhalation, which made its appearance just about the time that the sensorial symptoms began to abate, the

vein refilled at the pulsating point, the pulsations becoming again more manifest. A more exact account of the condition of the vein at this period will be given after the description of the rhythmical changes alluded to at the outset of this paper.

4. *Rhythmical changes in the venous pulse.*—When the portion of the veins above referred to was attentively watched, it was seen that, besides the changes which have been recognized as constituting the venous pulse, there were other periodical variations in the size of the pulsating portion of the vessel. These latter occurred at intervals which by their length recall the rhythmical changes in arterial tension described by Traube, Hering, Cyon, and Sigmund Meyer, and which perhaps are the cause of the long waves of movement of the brain noticed by Mosso and others, including one of ourselves.

In other words, besides pulsating in the usual manner, the vein, at the point alluded to, was seen to dilate and contract gradually in periods corresponding to about five respirations. The vein thus seemed to be pulsating under the influence of two distinct systems of waves, one synchronous with the cardiac impulses, the other, the long waves, due perhaps to changes in arterial tension. Under the influence of these long waves the diameter of the vein varied, independently of the ordinary pulsations, often as much as in the proportion of two to one. While such a wave was at its height, each ordinary pulsation seemed to diminish the diameter of the vein by about one-half, whereas at the lowest point of the wave, the ordinary pulsations almost obliterated the calibre of the vein. The passage from the highest to the lowest point of these long waves was gradual and pretty regular, though not absolutely so, the period of each wave occupying, as has been said, the time of about five respirations. These waves were to be made out at every examination when carefully sought for, but were not always equally marked.*

To recur now to the condition of the circulation during the second stage of the amyl experiments, when, as was said, the vein refilled as the subjective symptoms began to diminish in intensity.

It was noted that after refilling, the vein remained for a few seconds persistently distended to the size which it usually had at the

* Dr. Wadsworth has since observed this phenomenon in several other cases, in fact, wherever it has been sought for, provided the pupil was of fair size, the media clear, and there was a well-marked venous pulse. It is not, however, intended to assert by this that the phenomenon must always be present under such circumstances.

height of the long waves, the cardiac pulsations continuing, however, and then the long waves again began to show themselves.

In the first two experiments with amyl nitrite, the period of inhalation was short, and it occurred to us as a possibility, that the coincidence of the secondary filling of the vein with the passing off of the subjective symptoms might be only accidental. To determine this point, the inhalation was repeated and continued a much longer time than before.

In this instance also the vein remained narrowed so long as the effect of the drug was kept up, and again refilled as the subjective symptoms diminished. During this last experiment it did appear as if there were some slight increased fulness of all the veins of the retina, but it was at most of trifling amount. No change in the general color of the disk was observed in this or any other experiment.

NOTE.—Since this paper was written, we have made observations as to the effect of amyl nitrite on two separate occasions. In the main the results agreed with those above described, but as there was a variation from those results in some minor points, it may be well to mention them here.

During both these latter observations the rate of pulse of the individual inhaling was noted every five seconds by a third person, Dr. Garland, who also noted down the time at which changes in the character of the pulsations of the retinal vein were observed to occur, the time at which the full effect of the drug was felt by the inhaler, and the time at which the inhaler noticed that the effect began to diminish. It is not our desire to give here all these details, which must of course vary, even in the same individual, with the rapidity, amount, and length of the inhalation, but only to refer to the effect on the pulsation of the retinal vein.

In each experiment a capsule sold as containing ten minims of amyl nitrite was broken in a handkerchief, and from four to six full inhalations taken through both nose and mouth.

On both occasions, coincident or nearly so with the first free inhalation, the vein was observed to assume the condition which we have called that of venous systole, and it continued in this condition for about a minute. Then it changed rapidly to the condition of venous diastole, and remained in this state for one and a half to two minutes. During both these periods no variation in size due to either the long or the short waves could be observed. At the end of the second period both systems of waves began to be evident, but it was still

nearly a minute before the pulsations had returned to a regularity and extent approximating that observed before the inhalation was begun. It may also be stated that the time at which the vein changed from the condition of systole to that of diastole, was, in our observation, almost exactly the same; in the other, some ten seconds earlier than that at which the inhaler noticed beginning diminution of subjective symptoms. This discrepancy is hardly to be regarded as of importance in consideration of the difficulty the inhaler experienced in telling *exactly* when the decrease of subjective symptoms began.

CASES OF OPHTHALMIC DISEASE IN WHICH ENFORCED EXPOSURE OF THE EYES TO LIGHT AND AIR WAS SALUTARY. By Dr. C. R. Agnew, New York.

It is often a nice question in ophthalmic therapeutics whether the sensitiveness of an eye to light and air is to be indulged or resisted, and at what point in the progress of treatment exposure to light and air must be insisted upon, even though the apparent immediate effect may be to induce photophobia, lachrymation, or other indications of suffering. The following cases may, in unfolding the subject, serve as a basis for some safe and useful practical deductions. It is in this hope that we give them to the Society.

The first case is one of phlyctenular keratitis in a girl six years of age. The child had always lived in a salubrious mountain district, and had had fair health. The mother stated that there was scrofula in the blood on the father's side. The eyes had been inflamed for some weeks before they came under our observation, and during that period were constantly closed. For more than two weeks the extreme photophobia had caused the child to be confined in a dark room and to bury her face in a pillow, both during sleep and when awake. Under these circumstances the child was brought to New York to be under our care. The photophobia was now so extreme that even the most imperfect examination of the parts was difficult,

and accompanied by violent spasm of the orbicular muscles and paroxysms of sneezing.

It was ascertained, however, that there were small superficial ulcers upon both corneæ, with delicate vessels starting from the coronæ, and slight circumcorneal injection.

Well lighted and airy rooms were got for the patient at a high level in a good hotel. A good dietary, including milk, fruit, and a moderate amount of beef, was prescribed. The amount of exercise and exposure to light was restricted, and attention was paid to bathing and every other sanitary need. The eyes were treated locally with atropia, levigated calomel, and water-baths at the most agreeable temperature. Iron and cod-liver oil were given internally, and at night the entire surface of the body was rubbed to a glow and anointed with vaseline. The child improved in color and general condition, but not so the eyes; they remained unchanged. A double canthotomy was accordingly done, under ether, hoping thus to relieve the extreme spasm of the orbicular muscles. The general tonic course was continued after this for a period of seven weeks, without any appreciable amelioration of the state of the eyes. Much exercise in the light was simply impossible, as the child, when taken to the streets or park, except at night, would resist with loud crying. The eyelids continued to be, as they had been, swollen and red, and every attempt to inspect the eyes was resisted and provocative of a gush of acrid tears and persistent paroxysms of sneezing. When the lids were forcibly opened, the eyes, although not extremely red, were moderately so, and the general surface of the scleral conjunctiva and cornea had a soaked look. All the appearances impressed an observer with the idea that the repair of the diseased surfaces was prevented by the perpetual soaking of those surfaces by the excessive and altered secretions, and that the leading indication was to open the eyelids forcibly.

On the 30th of March, to meet this indication, the child was placed under ether in a well-lighted room. First one eye and then the other was forcibly opened with a spring speculum. The eyes were thus, for a moment or two, exposed to the light and air, until the corneal surface began to look slightly dry, and the excessive secretions were carefully removed from the cul-de-sac with a soft linen rag. These proceedings were repeated several times in the case of each eye for about fifteen minutes in all. When the full flood of diffused light entered each eye as it was held open, it was observed that some resistance was made by the child, although at

other moments the anæsthesia seemed to be complete. The treatment was repeated on the next day, the 31st inst., and again on the 3d, 5th, 7th, 9th, and 11th of April, in all seven times, and in every instance with the effect of lessening the intensity of the photophobia and orbicular spasm. On the evening of the 9th inst., after the sixth application of the method, the child, for the first time in nearly three months, voluntarily opened her eyes. On the 10th she was still able to open them. On the 11th the effect of the ether was prolonged, although the quantity used was not greater than on previous occasions, and there was much vomiting during the afternoon and evening, and also the next morning after breakfast. On the 13th inst. the eyes were widely opened, the corneal abrasions healed, the conjunctival congestion almost all gone, and the photophobia and lachrymation not annoying. In a few days the patient went away well, and on inquiry some months later was reported as being still so. Dr. Webster saw the child a year afterwards and reports that she was still well.

It is, we think, fair to suppose that the main agency in the cure was the forcible exposure of the badly nourished eye tissues to the action of light and air. The influx of light and contact of air would naturally awaken the dormant or perverted energies of the tissues, and quicken the reparative action. It may be said that the repeated effect of the ether would tend to neutralize morbid sensibility and harmonize the reparative forces. We are aware of the possibility of such an agency, and would not exclude it entirely in this case. Indeed, we have often seen, in cases of phlyctenular disease, where extreme photophobia had induced the use of an anæsthetic to facilitate the examination of the offending eye, the distressing symptoms greatly lessened on the recovery of the patient from the anæsthesia. But in this case the patient had had ether employed and a canthotomy done without benefit, and subsequently got well as described.

Moreover, in other instances, in older subjects, we have tried the method of forcible exposure, without the intervention of an anæsthetic, and with good effect enough to make us trust it in otherwise incorrigible cases. The following case, although not retained to its end, may illustrate our meaning: O. B., seventeen, was hit in the eye with an apple-core in 1874. Superficial inflammation ensued, which ran into double trachoma and panniform keratitis. He had had all the benefit of treatment by various skilful hands, and ran the gauntlet of those who had advised multiform nostrums. He came under our observation March 26, 1878. His photophobia was extreme, and

it was almost impossible to inspect the eyes on account of violent and prolonged paroxysms of sneezing which agitated his head and entire body whenever the lids were forcibly opened to admit light. The patient was etiolated and very feeble by continuous incarceration in the darkened room of a tenement-house. When the attempt was made by digital pressure to antagonize the orbicular muscles and open the eyes, every muscle in the face and neck seemed to resist, and his mouth would open widely in the general grimace. In this case we used the method of forcibly opening the eyelids with the spring speculum and without any anæsthetic. We placed the patient erect with his back against the wall, and facing a north window, and introduced the speculum into one eye at a time, and kept it clamped in place, widely distended, while the patient slowly counted one hundred, we having observed that that marked the limit of his endurance. The act of counting diverted his mind and consumed five minutes. We then did the same with the fellow-eye. In placing the speculum, care was taken to open it as widely as possible and then to clamp it, so as to distend the palpebral slit to its utmost. The effect of this treatment was so marked and immediate that the patient soon left the office able to open his eyes partially, and returned on the following day with both eyes more widely opened, and so tolerant of manipulation and light as to make an inspection relatively easy. Again the speculum was introduced as before, and the palpebral slit distended. The improvement went on continuously during the few days that this patient was under treatment, but the pannus and the old opacities darkened the prognosis, and he soon failed to reappear.*

We might adduce other cases of this class, but enough have been given to impress the lesson that because light produces distressing symptoms in certain eye cases we are not, therefore, to indulge the patient in his desire to live in the dark or to multiply eye-shades; but, on the contrary, to resort to active measures, which, on superficial observation, might seem to be opposed to the indications of treatment. Many so-called indications remind one of the sign-board at a cross-roads, which, having been blown down in the night, was replaced so that its directions were exactly wrong. We must test indications by most careful deduction, to which all the phenomena drawn from many related cases yield their true logical value.

While transcribing the last case, a case of extremely irritable, non-specific, interstitial keratitis in an adult came under observation, in

* Seen some months later and condition of the eyes vastly improved.

which out-of-door life, foot exercise, a daily air-bath with friction with the hair mittens, and a Turkish bath every other day, inaugurated a new action and led to reparative changes. In this case there had been acne and a tendency to lay up loose, flabby flesh.

The following case, which had been kept in the dark for nearly *nine years*, will illustrate the danger of not translating correctly the indications for treatment. H. B., 21, was first seen by us in his home in a distant part of the State. We reached his house in the afternoon and were shown into a darkened hall, and thence escorted through a darkened ante-room into the dark chamber in which the expectant patient was incarcerated. Screens and window-shades, and outside blinds had been so cunningly arranged that our limp patient with the moist, flabby hand was invisible until we insisted upon having the light of a dim candle. The history of the case was as follows. Nearly nine years ago, after reading steadily for three hours, he suddenly felt a sense of numbness and formication around the eyes and in the forehead between the supra-orbital nerves, and lost the power of fixing his eyes steadily even on large objects. Photophobia soon supervened, "amounting almost to agony." He betook himself to a dark room, in which he remained continuously for nineteen months. He then was taken, with eyes so covered as to exclude light, to a distant town, where he was treated for some months "for paralysis of the optic nerves." He grew worse under this treatment, and therefore returned home and to the dark room, in which he remained for the remainder of the period of nine years, only going out occasionally, and then after dark, and always with the precaution of a shade of some kind to exclude moon or star light.

It was obvious that the habits of years could not be changed in a domicile in which almost every device suggested by tender solicitude for the sufferer was, in our opinion, working against the cure. We accordingly suggested his removal to the Manhattan Hospital, New York, which was accomplished on November 1, 1873. He was brought to the hospital with his eyes so covered by black bandages as to exclude every ray of light. These were removed in spite of fervent protests. The vision was then tested under as much light as he would bear, which was, however, of a degree making reading for the normal eye difficult. It was found that he could read Snellen No. 6½ at eight inches. It was with great difficulty that he could be persuaded to fix his eyes on any object. The effort to do so caused them to roll about in the orbits, and his head to nod and jerk backward and forward. He would throw his arms about in an aimless

manner, and exhibit in various other ways the want of self-control. We could not classify the symptoms with chorea. He was blanched in color, through long seclusion from light, and greatly emaciated. A few days after his admission we made an ophthalmoscopic examination, and found that he was myopic, and that there was slight neuro-choroidal hyperæmia. As regards the latter phenomenon we were by no means certain, however.

The treatment consisted in gradually increasing the exposure of the eyes to light, for which specific directions were given daily, and a course of simple calisthenic exercise and stated out-of-door walks. We broke up at once the habit of depending upon others for every want, and on one occasion, having taken him a little distance from the hospital, suddenly left him to find his way back alone. It was interesting to observe how, in a child-like manner, he regained the ability to wait upon himself, having lost the art so thoroughly by nine years of dependence upon others, though by no means deficient in intellect.

Nov. 17th.—The vision for the distance was tried and found to be $\frac{20}{40}$ with $-\frac{1}{10}$. He was then put upon a course of hypodermic injections of nitrate of strychnia.

Dec. 22, 1873.—Vision $\frac{20}{40}$ with $-\frac{1}{30}$. He was now sent home, with specific instructions to live in the open air and to expose himself to sunlight. Shortly after leaving the hospital *psoriasis* broke out on his forehead, covered the scalp, and spread on to the neck, and was so inveterate as to compel him to return to the city for treatment.

In November, 1874, the date of the last notes in his case, the vision was as follows: Right, without glass, V. $= \frac{20}{200}$; with $-\frac{1}{30}$, V. $\frac{20}{30}$. Left, without glass, V. $= \frac{20}{200}$; with, $-\frac{1}{20}$; V. $= \frac{20}{30}$. The eyes were no longer sensitive to light or in any way troublesome.

Some years previously to our seeing this case we had seen another case almost the fac-simile of it, both as regards history and recovery. That was in the person of a young man from Vermont, who had been incarcerated in the dark for more than eight years for an eye affection in which photophobia was the ruling symptom. In that case not only had the general health been profoundly depressed, but epilepsy had been superinduced. In that case also the main element in the treatment which we employed was the use of light, with regular exercise to quicken tissue-change and tissue-building. Formerly it was the almost universal practice to immure patients in the dark, not only for affections in which photophobia was a symptom, but for any eye dis-

ease or injury, irrespective of the effect of light. The exclusion of light necessarily involved also the exclusion of air, and as the sufferer was ordinarily confined to the same room by day and by night, and not unfrequently with a number of other victims, an unsanitary state was produced, the odor of which is quick in our memory to this day. That entity compounded of body odor and darkness has never ceased to be repulsive or to impress its lesson upon us, and yet we can look back with the conviction that we also have been too prone to exclude light in the treatment of our patients. We may adduce the change which has occurred in our treatment of cataract cases. We can easily recall the time when we shut our patients in darkened rooms, after cataract extractions, for a period varying from one to five or six weeks, with only occasional introduction of daylight. Now, we never shut them in the dark. The instructions are to have the apartment light enough for the attendant to see to read ordinary print, while we exclude light from the patient's eyes by means of a black shade or darkened coquilles so long as entire rest of the wounded organ may be essential to the cure, watching carefully for the earliest moment at which the use of light as a remedy may be adopted. By this method the patient lives in an atmosphere so illuminated as to be conducive to general nutrition and to the uniform practice of a hygienic regimen. The quality of the nursing is always better when light pervades the sick-room. The attendants are more cheerful, and more exact in all their manipulations. Specific directions given by the surgeon will ensure the coaptation of the black silk mask over the eyes, or the use of the dark coquilles, and make any sudden exposure of the eyes themselves to the light improbable.

It may be said that we cannot safely deduce from such cases rules to be applied in the treatment of other cases in which photophobia exists, or in which rest of the organ of vision is naturally demanded. This leads us to ask the questions whether light should *ever* be entirely excluded from the room in which an ophthalmic case is, and if so, under what conditions, and whether it is not better to use contrivances to exclude light from the eyes, while it is allowed to pervade, with its life-giving power, the atmosphere in which the patient is kept?

These questions involve the sanitary construction and management of ophthalmic wards. In answering these questions we would say emphatically that we would not shut a patient in a dark room except when nature provides the way at night, or for such other and brief periods during the day as might be agreeable for sleep or entire quiet,

or for the temporary application of iced or other dressings incompatible with the use of the black silk eye-mask or coquilles.

In cases of retinal, neural, or choroidal disease, in which local bloodletting should be immediately followed by absolute exclusion of light from the eyes for a period varying from twenty-four to thirty-six hours, the use of the black silk mask carefully adjusted meets the indication fully, and having been applied securely by the surgeon, is less likely to be so displaced as to admit light than window-screens to which incautious persons have access.

The value of the local method of excluding light is very great in all those forms of cachexia, like gout, rheumatism, syphilis, and scrofula, in which we have to use every sanitary resource to cure the patient, to lessen the amount of local damage, or to diminish the tendency to recurrence of the local disease.

The inducement to shut a patient in the dark in iritis, for instance, is almost irresistible. The nature of the tissues primarily involved, the importance of such related parts as the crystalline lens, the ciliary organs, and the choroid, seem to make it the imperative duty of the surgeon to put his patient in the dark and to keep him there until he is well. We are bound to say, that in our experience, ambulant patients with acute iritis get well with as few permanent lesions as any other class, and in less time. This fact was early forced upon our attention by observing the results of practice in dispensary patients, as contrasted with those of patients in the walks of life in which every element of rest and seclusion and medical attendance in domicile could be commanded. To our surprise, the poor man, exposed to many hardships, would get well quickly, while the more luxurious patient would linger, and perhaps suffer more and have more relapses.

Atropia, Turkish baths, and Mercury are the cardinal remedies in iritis, and the first-named can never be safely omitted. Over and over again we have seen patients with acute iritis far on to convalescence within a week after beginning such a plan of treatment, and without any other precaution against exposure to light than would be afforded by a pair of smoke-colored coquilles, medium shade. It may not be considered a useless digression if we say here that we always use a solution of sulphate of atropia at least four grains to the ounce, and apply it every ten minutes for six or eight consecutive times before we allow the patient to go from observation, and order an immediate Turkish bath. We have frequently seen a pupil dilated fully after a Turkish bath, which had previously yielded little, if at all. Where such baths are not to be had, their effect may be imitated by

any method which produces free sweating and is accompanied by shampooing of the head.

As we have seen, a few hours of improper incarceration in a dark room may give a character to a case which will deceive both patient and physician as regards the true indications. We cannot be too much alive as to the danger our patients are in of forming habits which, although apparently essential to recovery, or to any degree of comfort even, are directly in the way of a possibility of cure.

As an illustration of this principle, we adduce another case in addition to those already given.

Some time ago we were called in to see a lady of middle age, who for many months had been confined to a dark room. Not being well, and being of a very nervous temperament, she had become alarmed when her eyes, which had previously been strong and useful for all purposes of vision, began to be defective in endurance and to grow morbidly sensitive to exposure to ordinary use and common light. Instead of throwing off some of the enervating appliances of luxury, she gradually ceased from exercise, and as she grew weaker, spent more and more time in bed. Day after day she shut the light and air more and more from her apartment, until when we called she was existing in a room which was as hermetically sealed against light and air as a room with two large windows and three doors could be. There were at the windows outside blinds, inside shutters, and hanging curtains. All the doors except one were closed, locked, and their marginal cracks and key-holes stuffed with cotton. The door by which access was had to the chamber was at the end of a double-door hall and leading out of an adjoining room, which was kept dark. It was difficult to persuade either the attendants or the patient that so small a light as a candle would be tolerable. A candle was got, however, and after great difficulty an examination made. We could find no organic disease of the eyes, nor any spinal or cerebral malady to account for the extreme hyperæsthesia. The main cause of the aggravated symptoms seemed to be a yielding on the part of the patient to the photophobia until all power to resist it was in abeyance, and nothing could come in to act as a curative except the firm will of the medical attendant subverting the entire method of treatment previously employed. In a very few hours we had the patient moved into a clean, dimly lighted room, and the chamber from which she had been extricated, sunned, ventilated, and scrubbed, processes to which it had not been subjected for several months.

We are prepared then to say, in summing up our experience, that daylight should not be excluded from apartments in which ophthalmic cases are being treated. That it will be frequently necessary to oppose vigorously the tendency of a patient to dwell in the dark. That, as a rule, the importance of and necessity for the use of light as a remedial agent will be in inverse proportion to the inclination of the patient. That we cannot always depend upon the presence of photophobia as an indication for the prolonged use of darkness as a remedy. That photophobia is not usually a very marked symptom in retinal, neural, or choroidal cases in which the interrupted use even of darkness as a remedy is demanded, but that the ophthalmoscopic lesions are more to be depended upon as guides. That, as a rule, corneal and iritic affections do not demand the entire or continuous exclusion of light, and that many cases of those diseases are either aggravated or made hopeless by such exclusion, and especially when they are not traumatic, but the offspring of some diathesis or cachexia. That under the latter circumstances every hygienic and therapeutic consideration is opposed to the exclusion of light. We recall, in writing this sentence, a case of syphilitic iritis to which we were called in consultation, where the patient had been kept for three months in the dark, and during most of that time under the full effects of mercury, without saving his eyes, and with the result of a bankrupt constitution. We will not soon forget the wretched appearance of the victim as we let the light of day upon his blanched face, and saw the drooling of saliva from his flabby lips.

We believe that it is better to depend upon some opaque covering for the eyes when partial or complete darkness is to be used as a remedy, and not to exclude light from the apartment, and by such exclusion to lessen ventilation and induce etiolation.

Scarcely a day passes in our practice in which we do not see one or more cases where damage has been done, and often of an irreparable nature, not only to the general health, but also to the diseased eyes, by methods the opposite of those which we are striving to commend to your favor.

PHOTOPSY FROM AN INJURED EYE, PERSISTING SIX MONTHS AFTER ENUCLEATION. By Dr. J. J. B. Vermyne, New Bedford, Mass.

Mr. F. Tr., 53 years old, stonecutter, while engaged at his trade, received an injury of his left eye. This happened during the latter part of August, 1876. He was aware of the entrance of a foreign body in the eye—whether a piece of iron or a piece of stone—by a sudden, dull pain and an appearance as a large red ball before the eye, which was soon found to be entirely blind. There was severe conjunctivitis of the bulbus during a few days, but this and the pain gradually subsided under continued application of cold water, while at the same time the vision seemed to improve. This improvement, however, ceased very soon, and he found that the eye was growing blind, for which he came to consult me on September 26th, nearly one month after the injury. He is a strongly built man, has always been temperate in his habits, and with the exception of a slight rheumatic affection, has never had any sickness. He has received frequent injuries to the eyes from the presence of foreign bodies, but they could always be easily removed and never left any trace. There was no redness; the cornea showed a small scar very near the margin on temporal side, otherwise clear. Iris same color as other eye; has a little below the horizontal meridian, and slightly inward and upward of the corneal opacity, a separation in its continuity in the form of a rent nearly one line in length, encroaching neither upon the pupillary or ciliary margin. Corresponding in direction with this rent is a posterior synechia of the iris. The lens is cataractous, more dense on the temporal side, in the immediate neighborhood of the synechia, less in the centre, and but very slightly on the nasal side, where fingers are counted at about two feet distance. Examination with the ophthalmoscope after instillation of atropia shows only the one synechia above mentioned, light reflex from the fundus through the rent in the iris-tissue, faint reflex from the fundus oculi through pupil, except at the nasal side; but even there no details of the fundus could be seen. There is not the slightest pain, his only complaint being the loss of vision. With the almost indubitable presence of a foreign body within the eye, and the impossibility of an

exact location, I advised enucleation of the injured eye, which was refused. After explaining, however, the danger to the other eye from sympathetic ophthalmia, he promised to submit to the operation as soon as his right eye should indicate the slightest trouble, or when inflammatory symptoms should appear in the injured eye. I thought of the possible chance that the foreign body, which, according to the direction of the corneal and iris wound, had penetrated in a slightly oblique direction, might be held in the lens, and of a removal of both by cataract operation, and therefore was perfectly willing to postpone enucleation. The patient went to work again, and had no trouble until the end of December, 1876; the opacity of the lens was meanwhile increasing. At the time mentioned, being at work in the cemetery on a cold day laying curbstones, he was attacked by rheumatic pains, which, after a couple of days, seemed to localize more in the head, especially in the supraorbital region, and were accompanied with scintillations from the left eye, appearing in the form of a red smoke, as from a distant fire, as soon as he closed his eyes for sleep. The frequency and duration of these perceptions varied very much; usually, however, they were severe enough to rob him of any refreshing sleep. To the different means employed, hirudines at tempora, blisters, morphine internally and hypodermically, bromide of potassium, iron and quinine, hydras choralis, etc., there was an occasional response with temporary relief, but soon they had to be given up, as not producing any lasting benefit. Both the pain and the photopsy gradually increased; the pain, extending first over the temporal region and then farther backward, until the whole head was affected, was almost continuous, with nightly exacerbations. The photopsy assumed the form of strong flashes of light darting out of the eye, to a length of from 5 to 6 inches, making their appearance every night when he tried to go to sleep, occasionally in day-time. When the photopsy was at its worst he often imagined hearing a hissing sound accompanying the flash. During all this time there was never any redness of the eye, nor sensitiveness on pressure in the ciliary region; and the uninjured eye, although repeatedly examined functionally and ophthalmoscopically, never showed the slightest trouble, although at the worst stages of his suffering he thought that occasionally a flash of light would dart out of that eye too. I was at a loss to explain these severe symptoms. When they first made their appearance there was considerable swelling of the cataractous lens; but after some time not only the swelling subsided, but absorption of the cataract took place, without any abatement in the other symptoms. At last

there was only a very slight webby opacity left in the pupil, a little more dense in its lower part. With the ophthalmoscope light reflex was not only obtained from the fundus, but here and there some of the details became visible in some detached parts of the retinal blood-vessels. A clear view of the fundus could never be obtained on account of a large number of thick floating opacities in the vitreous. Vision began to show again to the amount of $\frac{1}{10}\frac{5}{0}$. Sometimes I suspected that I could see the foreign body, but I never felt sure enough to locate it. Again I supposed that the foreign body might not be imbedded, but free in the posterior chamber, and that with the watery condition of the vitreous, evident from the rapid and multiple movements of the opacities in that body, the foreign body might change its place, and impinge directly upon the optic disk when he tried to lie down for sleep. I therefore advised sleep in a more or less sitting position, but of no avail. The trouble appeared just the same then as before. Finally, fearing that death from exhaustion, or insanity would follow as a result of this continued suffering, but with great misgivings that the trouble might no longer be local, but central, at the patient's earnest request I enucleated the left, injured eye on January 26th of this year, nearly 17 months after the injury. Fully $\frac{1}{2}$ inch of the trunk of the optic nerve was removed with the eyeball. The section of the nerve appeared normal. On opening the eye the vitreous was found very fluid, and in the retina, about one optic disk distance toward the nasal side, was found a piece of iron, about one line in length and half a line broad and thick, with one edge a little sharper than the other, however, so loosely imbedded in the tissues, that it falls out of itself, showing a slight unevenness in the place where it had lodged. The result of the operation showed that my misgivings were not without cause. For although the pain and photopsy have somewhat diminished, at this moment, six months after enucleation, they still persist. The same remedies as before enucleation were also resorted to after this operation, in addition to Fowler's solution, ergot, and iodide of potassium, but without any more effect than before. A careful regulation of his diet, and iron and quinine persistently exhibited for quite a long time, have improved his physical appearance, and this, with the fact that I tried to reassure him that the photopsy would slowly disappear when his general health should nprove, has probably contributed greatly to the decrease of the ervous excitement he was laboring under before the operation. But iere is still pain in the region of the ophthalmic branch of the igeminus, and in that of the auricularis and occipitalis, with occa-

sional rheumatic pains in the limbs, increasing with the slightest cold or exposure. The photopsy is also present, though the flashes are not quite so severe; they are not so extensive or so bright, do not last so long as before, so that since a couple of months he can obtain sleep without any artificial means. The flashes are now always unilateral on the side of the enucleated eye. The vision of the right eye is perfectly normal. The conjunctival sac of the enucleated eye has a perfectly healthy appearance, and pressure with a probe-point on different parts of this membrane does not produce any pain or photopsy. The neuralgic pains still continue to show their nightly exacerbations.

I have been unable to account with certainty for the relations between the probable occasioning cause of the trouble, the foreign body within the eye, and the subsequent nervous symptoms. Although the foreign body itself could not be seen, yet its retention within the eyeball could be suspected by tracing its path through cornea, iris, and lens. For this reason I was afraid of the danger of sympathetic ophthalmia, and of this I gave due warning. But I was not prepared for the symptoms as appearing in our case, especially with such severity, and yet without any complaint of pain in the eyeball, nor the slightest redness or other visible symptoms of inflammation of the eye; neither was I able to obtain much information in the works on ophthalmic and nervous diseases at my command. The only notices on photopsy bearing to some extent upon the subject were in Wharton Jones, 3d American edition, page 300: "Analogous appearances of fiery scintillations, flashes of light, and colored coruscations, occuring spontaneously, are symptoms of irritation or excitement of the optic nervous apparatus—cerebral or ocular—from inflammatory congestion of the choroid, as above mentioned, rather than from inflammatory congestion of the retina. As such inflammatory congestion may end in amaurosis, so the luminous and colored spectra are symptoms of incipient amaurosis. They may continue to appear, however, after all visual sensibility is lost." Leber, in *Graefe-Saemisch Handbuch der gesammten Augenheilkunde*, Vol. V., p. 1046, says that "photopsy can be caused by increased filling of the blood-vessels, inflammation or unknown disturbances of the nervous system, as internal cause of irritation, or by much coarser, mechanical influences, dragging or compression by shrinking masses of connective tissue, calcification, etc.;" and a little farther: "also by compression of the optic nerve from masses of connective tissue in the process of shrinking after injury or after contusion of the stump in enucleation. In

some cases this photopsy can become so intense as to produce hallucinations, so that it may cause anxiety for the mind or life. As a rule, they are entirely removed by enucleation of the bulbus or resection of the optic nerve stump." Stellwag v. Carion, page 850, mentions the fact of photopsy continuing after complete amaurosis has set in, and in speaking of causes says, that optic hyperæsthesia appears as a symptom of congestive or inflammatory brain disease, delirium potatorum, narcotic poisoning, neuralgia of the trigeminus (Alexander), etc.

These few points, applied to the case reported, would allow of an explanation of the persistency of photopsy in two ways: the first cause was either intraocular, the foreign body within the eye, or the symptom depended upon an affection of the trigeminus, and might have been favored by the presence of that foreign body.

In regard to the first explanation, it could be presumed that the pressure of the foreign body upon the choroid, as stated by Wharton Jones, was the first cause of the photopsy. Although at no time while the patient was under my observation, a period of sixteen months before enucleation, could any symptoms of active inflammation be observed, yet some disease of the choroid might be suspected from the watery condition of the vitreous humor and the numerous large opacities within that body. The persistency of the symptom after enucleation might depend upon the same intrinsic action of the brain, by which strong and lasting visual impressions are so forcibly implanted in the apparatus of vision, that their after-images are either continually present in the field of vision, or at least make their appearance as soon as the patient begins to think of them. This latter condition might be highly increased by the great excitability of the central nerve system, from pain, sleeplessness, and especially from the anxiety caused by being conscious of the presence of some foreign body and the possible dangers it might bring. That such an excitable condition existed in reality is proved by the existence of aural illusion, in the form of the hissing sound accompanying the flashes of light, when they were the worst. In favor of this explanation are the facts that there never was any trouble before the eye was injured, that the impressions were at first entirely, later chiefly unilateral, and that, although by no means removed by the removal of the foreign body, they are decidedly less severe than before.

The second opinion would rest especially on the fact of this appearance after exposure, simultaneously, or almost so, with pains in

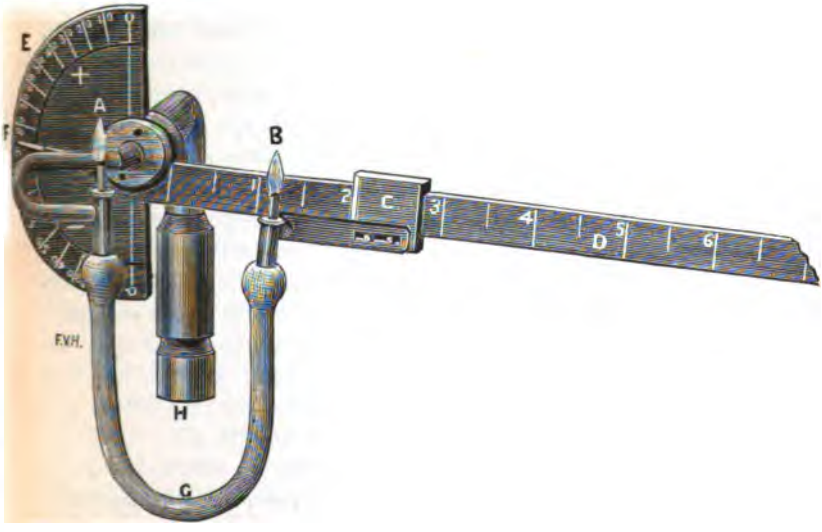
the region of the ramus ophthalmicus of the trigeminus, and of their persistency with the pains after enucleation, while it might be strengthened by the negative evidence of absence of visible irritation in the eye. In connection with the trigeminus affection there could be some local hyperæmia of the meninges at the base of the cranium, and therefrom pressure on some part of the trunk of the n. opticus. The excitability of the cerebral system would work here the same as with the other explanation.

That the persistency of optic hyperæsthesia in this case should depend upon pressure or dragging from shrinking masses of connective tissue I cannot believe, since the section of the nerve, which as a matter of precaution was removed for quite an extent, appeared healthy. In this respect I believe that my patient would readily submit to resection of the stump as advised by Leber, if I could give him the certain promise of relief, which of course I would not dare to do.

A PRACTICAL AND RAPID METHOD, WITH AN INSTRUMENT, FOR THE DIAGNOSIS OF THE REFRACTION.

By Wm. Thomson, M.D., Philadelphia.

The method which I have the honor to submit to your notice, and the instrument which I venture to call an Ametrometer, are intended to enable us to recognize promptly the presence of ametropia and determine its degree without the aid of test-types or test-glasses, the empirical use of which is attended by such serious expenditure of time. The full and entire paralysis of the accommodation with atropia is essential in this as in every other exact study of the refraction. The instrument is shown in the woodcut, and consists of



a small fixed gas-jet A, a second one B, attached to a box C, which slides upon a bar D, the jets connected by a flexible rubber tube G; the end of the bar F forms a pointer, which, by elevating or depressing the other end of the bar, can be placed at any part of the graduated half-circle E, which is fixed firmly to the thimble H, by which means the entire instrument can be attached to a common gas-burner, and the lights regulated by its stop-cock. We have here a

portable and simple instrument, giving one fixed light A, and a second B, which can be placed at our pleasure in contact or at any distance from the first, depending on the length of the bar, which is 30 cm., and at any possible angle with it, by moving the bar on a pivot opposite to the light A.

The jets having been lighted and turned down into two small flames about 5 mm. in diameter, the patient, placed 5 metres away, is directed to observe the flames, and to say whether he sees them as small points of light separated, or as diffused, enlarged circles which can be made to come in contact at their margins by sliding movements of the box on the bar, by the hand of the surgeon; bearing in mind that an emmetropic or corrected ametropic eye will resolve the lights into two until they pass one behind the other and become fused, whilst in ametropia the circles will seem to touch; whilst a distance, depending upon the degree of ametropia, remains between the small light points. To determine the kind of ametropia, the patient is directed to pass slowly in front of the eye under examination a slip of red glass in such a manner as to color half of each diffused circle, and if the red half seems to be on the same side with the red glass, myopia is recognized, and if on the opposite side, hypermetropia; this may be as well done by passing before the eye a card or paper in such manner as to exclude from view one-half of each circle.

To determine the degree of ametropia, the bar has been divided on one side into spaces of 2.5 cm. with a half-space between, and on the other into English inch and half-inches, and it will be found that each space of 2.5 cm. will indicate an ametropia of one dioptric, metric system, and each inch $\frac{1}{36}$ of the old system. The cut represents the two flames as apart 2 d., and they would appear to a person having M. or H. of 2 D. or $\frac{1}{36}$ as two circles of light, with their margins in contact at one point, separating on the removal of light B, and overlapping when it is placed nearer to light A.

For those who still prefer the old system to the metric, it must be remembered that the old glasses are not based upon their exact powers of refraction, but are ground on *radii* of Paris inches, and that, owing to the index of refraction of the glass commonly used, they by a happy chance correspond in focal length almost exactly with the English inch; hence, each inch of distance between the test-lights, as determined by the use of the inch scale on the bar, will indicate an ametropia of very nearly $\frac{1}{36}$; and the higher degrees can be found instantly by dividing 36 by the number of inches between the lights when their margins seem to have come into contact.

When astigmatism is suspected, the patient should be directed to observe whether the flames are longer in one direction than the other, and if so, by the rotation of the bar on a pivot opposite to light A, the two lights being placed some distance apart so that they do not appear to touch, we have one of the most accurate means of ascertaining the meridians of greatest and least refraction, since it will become easy for the patient to say when two elongated points or ovals of light are placed so as to have the same direction; and when this has been fixed, the pointer F will indicate on the half-circle the exact angle at which the lights are placed, and hence the position of the meridian of greatest ametropia.

On bringing the flames into contact at this angle, the real distance of the lights apart will indicate the degree of ametropia, and having thus found one meridian, the lights can be placed at right angles to it and the refraction of the second be ascertained. In difficult cases, or with poor observers, it may be an aid both in simple M. or H. and A. to color one of the flames by placing a slip of red glass in front of it, held by the surgeon.

Some experience in the correction of ametropia enables me to know how convenient it is to have more than one method of examination, and great care has been taken to perfect and simplify the method now proposed, in the hope that it might take the place of a rapid and accurate method of diagnosis, and thus greatly extend the benefits of careful corrections of ametropia.

For obvious reasons, based upon the rationale which follows, a distance of 5 m. between the patient and the instrument has been assumed, but others may be chosen; neither is it at all requisite to have so perfect an instrument, since examinations can be made with wax tapers or other small points of light, or they may be obtained at will from properly chosen reflecting surfaces.

To understand the method proposed, and make the best practical use of it, it must be remembered that an emmetropic eye only when at rest can receive on the sensitive portion of its retina a perfect image of a small light point placed at or beyond 5 m., and that it brings to a perfect focus on its retina rays of light only that are parallel; when the retina lies beyond this point, as in M., or within it as in H., a section of a cone of light must replace the point on the retina; and could the size of this circle of diffusion be measured clinically, the distance from the base of the cone to its apex, whether in front or behind the retina, could be calculated, and hence the degree of M. or H.

To estimate the size of this circle of diffusion the law of *projection* has been invoked, and by the method proposed, the dimensions of one are found by placing two circles on the observer's retina, choosing a fixed known distance between the patient and the test-lights, and measuring the real distance between the lights when their diffused images touch on the patient's retina, and appear to be in contact in space in front of him. Clinically this can be done by this instrument, the theoretical reasons being as follows :

Since all calculations based upon the optical constants of the human eye, composed of two complete and complicated dioptric systems, are and must be difficult to demonstrate, we have the highest authority for these purposes, for adopting the well-known simplified and reduced diagrammatic eye of Prof. Donders, consisting of but one curved surface of 5 mm. radius, a coefficient of refraction of $\frac{4}{3}$, a posterior focus of 20 mm., and anterior focus 15 mm ; since it is conceded that from these cardinal points by calculations we can trace any ray of light, ascertain conjugate foci, estimate the size of retinal images, etc., with confidence that the results will agree with those phenomena which occur in the human eye under like circumstances. As a consequence of clinical and theoretical study with this method, I venture to propose another to the constants of Donders' eye, in the diameter of its pupil, viz., 5 mm.

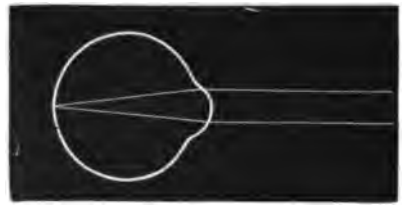


FIG. 1.—Donders' eye, showing the course of a beam of light arising from a distant point.

Finding within Donders' eye, a fixed quantity in the triangle of 20 mm. radius and 5 mm. sine or arc, we are justified in choosing a second one outside of it for purposes of comparison, and this is afforded by one of 5 m. radius, and arc of 125 cm. Could we regard the sides of the long beam of light in this figure as rigid wires 5 m. long, passed through holes in a metal cornea 5 mm. apart, and brought to an apex 20 mm. from it, we would have the outlines of a mechanical tool, like a pair of pincers, with the long handles without and the jaws within the eye; it would be evident that any separation of the ends of the wires

anteriorly would put asunder the posterior ends and imitate a circle of retinal diffusion; also that the wires would either diverge or converge at a distance from the cornea depending on the anterior separation; hence, any change in the arc of the large angle must produce changes in both angles, and finally that any separation of the two wires at the distant point would resemble the enlargement of a small light as seen by an ametropic eye.

The possibilities as to size of a circle of diffusion when projected, would be any diameter between 5 mm. and 125 cm., since, if the two wires were made to cross at the anterior focus of Donders' eye 15 mm., their distant points would be apart 125 cm. and the two points within the eye would be apart 5 mm.; the similarity of the large and small angles being assumed as the basis for these hypotheses.

The apparent enlargement of a small distant point of light to an ametrope metaphorically resembles the separation of the two wires anterior to the eye, whilst the divergence at the points within the eye is like the circle of diffusion which falls on the ametrope's retina. The directions of the anterior wires, whether they diverge from the cornea and if continued backwards would meet behind the retina, or converge in front and cross at some point, give us the direction of the rays of light in H. or M., and the distance from the eye to such points of junction would be the *punctum remotum*.

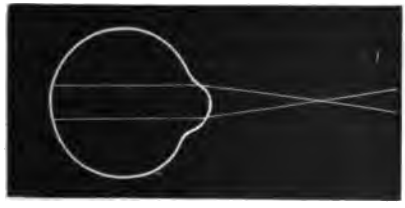


FIG. 2.

The convergence of the wires at a distance of 15 mm., the anterior focus of Donders' eye, resembles a M. of that degree, and would render parallel the jaws within, separate the ends 5 mm., and be attended by a separation of the anterior extremities of 125 cm., vide fig. 2.

Assuming that a small light at 5 m. is focussed on the retina of Donders' eye, let us reason upon the results of a condition of M. artificially produced by a + glass giving a *punctum remotum* of 25 cm.: the image of the light would now be a circle of diffusion, which would diminish as the light point was brought near, and come to a

focus when it reached a distance of 25 cm. or about 10″, and the rays had become divergent. We may now say as 250 mm. the length of the induced radius : 5000 mm. the length of the large radius :: 5 mm., the arc of small angle : the answer, being 100 mm. ; and hence we find by calculation that the circle of diffusion should appear by projection to be 100 mm., or 4″ in diameter. It will also be observed that if an ametropia with *p. r.* of 25 cm. gives rise to a circle of 10 cm., in like manner a *p. r.* of 100 cm. or 1 meter would cause a circle of 2.5 cm., and hence indicate an ametropia of precisely 1. dioptric.

Having thus demonstrated the probable diameter of a diffused circle as projected with an induced known ametropia, we can by reversing the process discover the very essence of ametropia viz., the *punctum remotum* of a myopic or hypermetropic eye by measuring the projected circle of diffusion at the fixed distance of the radius of the large angle, viz., 5 m.

Two lights now become essential, and when their diffused circles seem to be brought in contact, the distance between the lights will give the diameter as projected of either of the circles; and should the distance, for example, be 5 cm., what then is the *punctum remotum*, and hence, the degree of ametropia? We may then say as 50 mm. : 5 mm. :: 5000 mm., and multiplying the second and third terms together and dividing by the first, we find 500 mm. as the *punctum remotum*, and ametropia = 50 cm., or to glass = 2 D., or $\frac{1}{18}$.

It is now evident that this method simply enables a circle of diffusion to be measured clinically, and that a comprehension of Donders' eye gives a simple rule as follows: *Rule.*—Multiply the radius of the large angle by the arc of the small one and divide by the diameter of the circle as found by observation, and the result will be the *punctum remotum* positive + or negative —, and hence the degree of either M. or H., and the power to select glasses + or — spherical or cylindric which will restore the eye to emmetropia.

To permit the use of the English instead of the metric system, the following are the constants of Donders' eye in inches: radius of curvature 0.2″, anterior focus 0.6″, posterior focus 0.8″—and for this method, size of pupil 0.2″, radius of large angle 200″ or 16⅔ feet, arc 50″. A single case will illustrate the process of reasoning: C. is found to be myopic, and the lights are apart 5″ when their circles touch; we then say 5″ are to 200″, the long radius, as 0.2″ arc small angle to the radius of desired angle. We now multiply 200 by 0.2 = 40.0 and divide by 5″ and we have 8″ as the result, and the *punc-*

tum remotum—or an ametropia to be corrected by $-\frac{1}{8}$, or more accurately $-\frac{1}{9}$ placed $\frac{1}{2}''$ in front of cornea, which glass will render parallel rays which diverge from a point 8″ away.

Since algebraical formulæ are sometimes passed over by the reader without due interpretation, they have been avoided and the process reduced to the more familiar arithmetical law of simple proportion. With either the metric or the inch system the calculation for the glass required is too simple to need a table, since a separation of the test-lights of 2.5 cm. or 1″ will indicate either 1 dioptric or $\frac{1}{36}$.

In using for this demonstration the reduced eye of our great master Donders, we but pay a new tribute to his genius and industry, which leave so little for his followers to glean in the field of applied optics which he has cultivated so well; and it is not the least interesting result of the numerous clinical observations made with the instrument here described, that we can venture to propose to the distinguished author of the "Accommodation and Refraction of the Eye," a fixed quantity for the pupil of his reduced eye, which so well represents the properties of the complicated human organ, but simplifies all its optical problems in so wonderful a manner.

The practical use of the instrument has been recently tested in the examination of a number of deaf-mutes, one needing $+ 3 \frown + 4^{c}$, another $- 4 \frown - 3.5^{c}$ corrected to $V\frac{1}{1}$, without the very tedious use of glasses aided by the ophthalmoscope; and in a case of aphakia needing 11 D. corrected in a few minutes, and a high myopia brought to $V\frac{20}{XXV}$ by $-$ 15 D. with a very short examination.

AN EXAMINATION, UNDER ATROPINE, OF THE REFRACTIVE STATE OF EYES WITH NORMAL VISION ($\frac{20}{20}$), AND WHICH HAD NEVER BEEN AFFECTED WITH ASTHENOPIA OR INFLAMMATION.

By D. B. St. John Roosa, M.D.

It will be at once seen that it is a very difficult thing to procure for examination many eyes that answer to the above-named conditions; and when is added to them another, that is, that the subjects shall be between twenty and forty years of age, the difficulties are not diminished. The importance of such an examination is, however, I think, considerable, for it has been claimed by some that latent hypermetropia and astigmatism are the causes not only of asthenopia, conjunctivitis, blepharitis, etc., but also of chorea and lachrymal disease, while on the other hand, as good an authority as Dr. E. Hansen, of Copenhagen, is very sceptical as to the universal or even general value of the correction of hypermetropia for the relief of asthenopia. In a conversation with Dr. Hansen, last summer, he informed me that he found that glasses in very many instances seemed to utterly fail to afford relief to asthenopia associated with and apparently caused by hypermetropia. Dr. Hansen has peculiar opportunities for observation upon this subject, for he enjoys almost a monopoly in ophthalmic practice in the Danish capital; and patients have not the same liberty that is enjoyed in American, English, or German cities, of roaming about from one oculist to another when their glasses do not suit, or their eyes do not get well. We have had abundant statistics as to the existence of myopia and as to the apparent refraction of unatropinized eyes. I have thought it desirable, however, to learn the refraction of those that have been classified as emmetropic. It is claimed, however, that there is a source of error in drawing conclusions from this kind of an examination. It has been said that we almost invariably flatten the lens in putting an eye under the full influence of atropia. If this be true, we always either diminish myopia under such circumstances, or convert emmetropia into hypermetropia.

My statistics show that there was a certain proportion of cases among those examined that continued to reject even the weakest convex glasses, after atropia had been thoroughly used. Besides, I

think every one of us had seen cases of myopia which were not at all reduced in degree, after the drug had been employed long enough to test the matter. I cannot, in the face of these facts, assent to the view that atropia flattens the lens except in so far as it acts by paralyzing the ciliary muscle, and thus brings out the true length of the eyeball in a state of rest. Apart from this view, however, there is another importance to such an examination as I have made.

It has been generally, if not universally conceded, that, if atropia reveals hypermetropia in cases of inability to use the eyes for continued work, glasses are to be given somewhat in accordance with those taken when the eyes are atropinized. Some authorities even advise full correction. Now, if we find that a large proportion of eyes that have never suffered from asthenopia take convex glasses which were rejected before the mydriatic was used, we may suspect that the mere existence of lessened refraction or latent hypermetropia is no positive proof that asthenopic eyes are to be cured by positive glasses—in other words, that there may be other factors producing the trouble. The amount of latent hypermetropia revealed in these cases thus rigorously selected is in many instances equal to that for which oculists all over the world, ever since the publication of Donders' book, have been prescribing glasses. Indeed, I think it has been pretty generally assumed that the cause for a given case of asthenopia had been found if atropine revealed hypermetropia. In later times it has been claimed that the etiology of headaches, of chorea, of lachrymal disease, has been very largely traced to latent and uncorrected refractive errors. Whatever the subjoined statistics may be worth, they at least show, few as they are, that a decided amount of latent hypermetropia is entirely consistent with uninterrupted and painless use of the eyes. This, however, is a fact that I commented upon some two years since, having deduced it from other grounds, namely, that we were quite often called upon to fit presbyopes who were also hypermetropes, with glasses for the first time when their accommodation began to fail, they never before in all their lives having had any necessity for glasses.

We cannot any longer assume, I think, that latent hypermetropia is necessarily the sole factor in the production of asthenopia, much less of troubles of the head and nervous system. That hypermetropia does often produce many of these things, and that its correction will often relieve them, I am of course very far from denying. But I am unable to say why it does not in all of them, especially when in looking over my statistics I find that, in some of the cases that have

never suffered for an instant from asthenopia, all the conditions for the injurious influences of strain of the accommodation have existed in feeble organizations and weak muscular systems.

Had I not had the facilities afforded by a large class of medical students, who are very ready for physiological experiments, I should never have succeeded in getting the cases that I now present. I must here present my grateful acknowledgments to the members of the Class of 1877–78 in the University of the City of New York, who so kindly submitted to the troublesome tests. It of course goes without saying, that all the cases now about to be quoted conform to the conditions stated in the foregoing, *i. e.*, the patients were not presbyopic; they had also passed the age during which, in the opinion of some authorities, hypermetropia is always found; they had V. $\frac{20}{20}$, that sight was blurred by convex glasses of $+\frac{1}{60}$, and in some cases of still weaker power, they had never in all their lives suffered from asthenopia or ocular inflammation, and their accommodation was paralyzed by a four-grain solution of sulphate of atropia.

Observation.

I.—Dr. S., æt. 30. V. R. E. $= \frac{20}{15}$; L. E., $\frac{20}{20}$. After a four-grain solution of the sulphate of atropia had been used four times in twenty-four hours, the vision of the right eye was reduced to $\frac{20}{60}$. It became $\frac{20}{15}$ with $+\frac{1}{60} \supset \frac{1}{60}{}^{c}$ 90°. This gentleman used atropia for four days, and had some marked constitutional symptoms. The final examination showed H. $\frac{1}{36}$ with H. as $+\frac{1}{60}$ axis 90°.

II.—J. C. M., æt. 21. Began to go to school at seven, and has used his eyes as a student nearly ever since; V. $= \frac{20}{15} +$. All positive glasses blur. After the use of atropia, gr. four solution, three times in two days, vision with the right eye became $\frac{20}{30}$ with $+\frac{1}{48}$; L.E., $\frac{20}{40}$ without glasses, and $\frac{20}{30}$ with $+\frac{1}{30}$.

III.—W. H., æt. 34. After atropia four times in twenty-four hours, L.E. having been atropinized, V. $= \frac{20}{20} +$ before atropia, $\frac{20}{20}$ with $+\frac{1}{60}$; two days after, $\frac{20}{20} -$ with $+\frac{1}{60}{}^{c}$ 90° $\frac{20}{20}$.

IV.—H. J. H., æt. 29. Has used his eyes as a student and teacher since he was six or seven years old; is thin and pale, only moderately well developed; right eye examined after atropia instillation twice a day for two days. Accepts $+\frac{1}{24}$ on the second day, the day after $+\frac{1}{30}$ with which V. $= \frac{20}{20}$. Left eye of same patient was tested in the same way a month before; vision was $\frac{20}{70}$ under atropia without a glass, and $\frac{20}{20}$ with $+\frac{1}{24}$. The subject is anæmic and thin; has bronchitis every winter; one member of family died of phthisis.

V.—W. H., æt. 32. Has not been a very constant student; never the slightest trouble with his eyes, except occasionally after reading very fine print by gaslight for several hours, eyes have felt tired and he has been inclined to rub them; never obliged to stop work on account of his eyes. Is in good health and of robust appearance. After the use of atropia three times a day for three days, V. = $\frac{20}{20}$ and all glasses are rejected.

VI.—W. F. C., æt. 27. School at an early age; has studied medicine for a year. Interval of ten years, when his eyes were used only in ordinary reading. "Fatigue" of eyes after three hours' work. Is robust and in good general health, V. = $\frac{20}{20}$ R.E., accepts + $\frac{1}{72}$, rejects + $\frac{1}{60}$; L.E., $\frac{20}{20}$ + $\frac{1}{72}$, blurs; atropia two days, L.E.V. = $\frac{20}{70}$; with + $\frac{1}{30}$, = $\frac{20}{20}$.

VII.—H. R. D., æt. 21. At school until eighteen; writing for a year after; has studied medicine since. V. = $\frac{20}{20}$ + $\frac{1}{72}$, blurs; after one use of atropia, V. was not $\frac{20}{20}$ unless with + $\frac{1}{30}$.

VIII.—R. D. B., æt. 22. Has always been a student; = $\frac{20}{20}$, rejects + $\frac{1}{60}$. Atropia for three days, V. = $\frac{20}{30}$, declines + $\frac{1}{60}$.

IX.—C. A. V. R., æt. 22. At school regularly in Germany from sixth to seventeenth year; studied medicine three years; never the slightest asthenopia. L.E., V. = $\frac{20}{20}$, all convex glasses blur.

Four-grain solution atropia four times in eighteen hours. V. = $\frac{20}{70}$, with + $\frac{1}{30}$, = $\frac{20}{20}$.

X.—D. M., æt. 26. Has been a student since five years of age. V. $\frac{20}{70}$; atropia in left eye for two days. V. = $\frac{20}{40}$, with + $\frac{1}{48}$, = $\frac{20}{20}$; third day $\frac{20}{60}$; with + $\frac{1}{30}$, $\frac{20}{20}$.

XI.—W. A. W., æt. 24. Always a student. V. = $\frac{20}{20}$; + $\frac{1}{80}$ blurs. Atropia in left eye for two days. V. = $\frac{20}{100}$; with + $\frac{1}{24}$, $\frac{20}{20}$ — (it is a dark day), and the observer's vision is also $\frac{20}{20}$ —.

XII.—G. M. B., æt. 23. Went to school from five till eleven; then salesman and bookeeper; has studied medicine two and a half years. R.E., V. = $\frac{20}{15}$; L.E., $\frac{20}{20}$; all convex glasses blur; atropia one day. R.E., V. = $\frac{20}{60}$; with + $\frac{1}{30}$, = $\frac{20}{20}$.

XIII.—B. W., æt. 27. Went to school four months a year until fifteen; then to an academy two years for eight months in a year; taught school for four years; has been studying medicine for three years. V. = $\frac{20}{20}$, + $\frac{1}{72}$, blurs; atropia one day in each eye. V. = $\frac{20}{60}$, each eye, with + $\frac{1}{24}$, $\frac{20}{20}$.

XIV.—Dr. S., æt. 22. V. = $\frac{30}{20}$, each eye. Was for two weeks under the influence of a four-grain solution of sulphate of atropia;

suffered from great dryness of the throat; atropia did not alter vision, and + $\frac{1}{60}$ blurred before and after its use.

To these fourteen cases I will add one of a lady thirty-two years of age, who consulted me on account of neuralgic pains about the eyeball and orbits. There was also asthenopia, and she complained of muscæ. She had been unable to do fine work for the past two months. The patient is a nervous lady who is somewhat overworked with household cares. The refraction seemed to be H. by the ophthalmoscope. V. = $\frac{20}{20}$, and all glasses blur; after atropia was used for six days the vision was $\frac{20}{20}$, and the patient still rejected all glasses.

Summary.—Total number, 14.

Emmetropia, 3.

Hypermetropia, 11.

Degrees of H.:

$\frac{1}{36} \subset \frac{1}{60}°$ a 90°.

$\frac{1}{48}$, L.E., $\frac{1}{30}$.

$\frac{1}{60}°$, 90°.

R.E., $\frac{1}{30}$, and L.E., $\frac{1}{24}$.

$\frac{1}{36}$.

$\frac{1}{36}$.

$\frac{1}{30}$.

$\frac{1}{30}$.

$\frac{1}{24}$.

$\frac{1}{30}$.

$\frac{1}{24}$.

ON SOME IMPROVEMENTS IN INSTRUMENTS AND APPLIANCES FOR DIAGNOSIS. By JOHN GREEN, M.D., of St. Louis, Missouri.

I. TEST-DIAGRAMS FOR THE DETECTION AND MEASUREMENT OF ASTIGMATISM.

The diagram shown, of one-fifth its actual size, in Fig. A was designed and drawn by the writer, while spending a few weeks in attendance upon the clinique of Professor Donders, in the spring of 1866. The purpose was to construct a system of practical tests for astigmatism, to be used like the test-types of Snellen, at a distance of twenty Paris feet. A figure—Fig. 1—made up of three parallel lines with interspaces of the same width, which had been given by

FIG. 1.

Snellen in the first edition of his *Test-Types*, but which had been omitted from the second edition, was taken as the basis of the diagram. Twelve such sets of lines, arranged as radii of a circle, were printed in the centre of a clock-dial as being the only graduation of the circle familiar to all persons. Two other diagrams, Figs. B and C, were added, the one to indicate with more precision the direction of the principal meridians, the other to facilitate the measurement of the refraction in one or the other of these meridians when found. The triple radii of Fig. A were also engraved to show as white lines upon a dark ground.

The dial-card, mounted upon thick paste-board, was fitted with a central pivot for holding any one of the circular disks and permitting it to be turned into any desired position.

These test-diagrams were published, together with a brief description, in the Report of the Netherlands Ophthalmic Hospital for 1866, and also in the Netherlands Archives for the same year.[1]

A few months later, in a paper published in the *American Journal*

[1] Verslag Ned. Gasth. v. Oogl., VII., 1866. Ned. Arch. v. Gen. en Natuurk., II., 1866.

of the Medical Sciences,[1] the writer described an additional disk, Fig. F, and the two arrangements of short single lines or sets of parallel lines in linear series, Figs. D and E. The disk, Fig. F, was made by punching rows of circular holes, of about six millimetres in diameter, in black card-board, and covering the holes with thin tissue paper so as to adapt it for use as a transparent object to be hung in a window and viewed by transmitted light.

At the meeting of the American Ophthalmological Society, June, 1867, several additional diagrams and perforated disks, Figs. G to O, were presented, and at the meeting of 1868 a transparent test-object was shown, in form like Fig. O, but with the light radii in carmine red and the intervening sectors in ultramarine blue; in this last arrangement the presence of astigmatism is revealed by a conspicuous difference in the apparent color of the radii corresponding to the several ocular meridians.

The original impression of these diagrams having been for several years exhausted and the plates destroyed, new plates have been lately prepared, introducing several changes and additions which have been thought to be of practical utility.

In the plates first engraved the thickness of the lines was made to conform to that adopted in No. XX. of Snellen's test-types, with the design of making the recognition of the lines in any one meridian the standard of perfect vision in that meridian. It soon appeared, however, that such a standard was inapplicable in practice, and that the diagrams drawn upon this scale were more useful when placed at a distance not exceeding ten or fifteen feet from the eye. Lines much broader than those first adopted were also found to be more useful in many cases, and were therefore introduced in several of the diagrams of 1867. In the present edition the lines are drawn of three different widths, corresponding to a visual angle of one minute at distances of eight, sixteen, and thirty-two metres, and the tests are intended to be used at any convenient distance within the limits of an ordinary room.

Of the original diagrams, those shown in Figs. A, B, and K, are now reproduced upon a somewhat enlarged scale, so that the thickness of each line subtends an angle of one minute at a distance of eight metres. Fig. C is replaced by a similar figure, Fig. Q, drawn to the scale of two minutes at eight metres, and Fig. P, a similarly enlarged reproduction of Fig. A, is added. Figs. F, J, and O, are reproduced

[1] Am. Jour. Med. Sciences, N. S., LIII., Jan'y, 1867.

unchanged, the lines in Fig. O being drawn to subtend an angle of four minutes at eight metres, and the narrow sectors in Fig. J to subtend an angle decreasing from about five minutes at eight metres near the periphery of the disk, to about one minute at one metre near the centre.

The diagrams shown in Figs. R to Z are now given for the first time. Fig. R, suggested by a figure from Donders[3], is made up of black radii, about a centimetre in width, crossed by white lines half a centimetre apart and about a millimetre in thickness. Figs. S and T consist each of a triple ring, each single ring subtending an angle of one minute or of two minutes at eight metres. Figs. U and V show four and eight sectors respectively from Fig. J, and bear to the original diagram the same relation that Figs. C and K bear to Fig. A. The arrangement shown in Fig. U was suggested to the writer by Dr. H. D. Noyes, of New York, who has also publicly referred to it.[4]

The other new diagrams, Figs. W, X, Y, and Z, are combination figures of circles, as shown in Figs. T and S, intersected by radii as shown in Figs. A, P, B, and J. In these diagrams the contrast between the two sets of lines at the place of intersection is the strongest possible, and the difference is, therefore, more easily appreciated than in the case of diagrams made up of circles or radii alone. But in addition to the greater strength of contrast, a new appearance is produced, which is at once striking and easily described, viz., a broken or jagged aspect of the lines upon either side and in the neighborhood of the line or set of lines which is seen most distinctly and sharply defined. (See Figs. XX and YY, which are heliographs of Figs. X and Y, taken with a camera rendered astigmatic by the addition of a weak cylindrical lens.) In using these combination diagrams the attention of the patient is directed successively to the meridians of the greatest distinctness of the radii and of the circles, and lastly, for the purpose of accurately determining the direction of these meridians, to the exact positions in which the lines appear both sharply defined and unbroken.

Several of these tests may be readily used as transparent objects by punching out the light parts from disks of metal or card-board and pasting thin paper, which may be either white or colored yellow or red, over the openings. Figs. F, G, H, I, N, and O, are especially adapted to this treatment. By the process of printing in black

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[3] Anomalies of Accommodation and Refraction. Syd. Ed., p. 471, Fig. 158.

[4] Rep. Fifth International Ophthalmological Congress, N. Y., 1877, p. 173.

woollen "flock" on translucent paper, or varnished silk, or linen, it is possible to produce transparent tests in almost any desired form.

In the notation which has from the beginning commended itself to the writer,[5] and which has since been adopted by Snellen,[6] the upper end of the vertical meridian, or XII of the clock dial, is taken as zero, and the inclination of the meridian of greatest refraction is read off to the right of XII up to 90° with the *plus* (+) sign, and similarly to the left of XII with the *minus* (—) sign. This notation is based upon the anatomical law of bilateral symmetry, and brings out prominently the important relation of symmetry or asymmetry in the direction of the principal meridians in the two eyes.

Small figures made up of numerous very fine radiating lines were very early used to illustrate the general phenomena of astigmatic vision,[7] and Donders, in 1860 or earlier, used in an optometer a star shaped figure made up of fine radiating lines, as a practical test for astigmatism.[8] Burow, in 1863, suggested a similar or perhaps identical arrangement,[9] and two years later Javal, with the co-operation of Nachet, produced an elaborate binocular optometer in which substantially the same test-object was employed.[10]

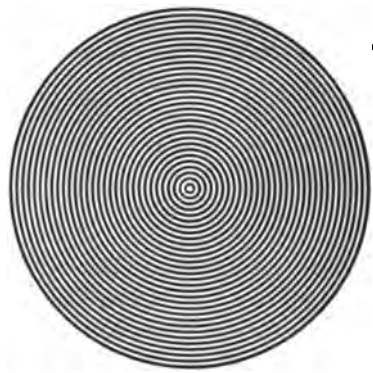

FIG. 2.

A disk covered with fine concentric circles, like Fig. 2, was long ago

[5] Trans. Am. Ophth. Soc., 1867–8, p. 134.
[6] Archiv für Ophthalmologie, XV., II., Tafel VIII.
[7] Helmholtz. Physiolog. Optik, Pl. II., Fig. 5.
[8] Archiv für Ophthalmologie, VII., I., p. 179.
[9] Ibid., IX., II., p. 230.
[10] Annales d'Oculistique, LIII., 1865.

used by Helmholtz [11] to illustrate and analyze that form of irregular astigmatism which depends upon refractive differences in the different sectors of the crystalline lens, and a coarsely executed lithographed card, containing a small disk of such construction, and also a small star-shaped figure made up of radiating lines, as in Fig. B, was many years ago sold in Berlin as a test for astigmatism.

Large test-objects, such as were first described and put in use by the writer, in which the scale admits of their being viewed from a distance at which the visual axes are sensibly parallel and the accommodation is ordinarily relaxed, are now perhaps generally admitted to offer positive advantages, in most cases, over small objects which must necessarily be held near the eye. In the selection of such test-objects from the great number of possible variations and combinations of the elementary forms, it has been found advantageous to include those of somewhat diverse appearance and drawn to several different scales. The coarser diagrams are especially useful in investigating the higher grades of astigmatism, and it is always desirable to have a number of fresh tests in reserve, in dealing with dull or careless patients. A further reason for varying the diagrams as much as possible is founded on the fact that many persons suffering from astigmatism find it very difficult to analyze and define visual perceptions which they know from life-long experience to be more or less inaccurate.

FIG. 3.

Diagrams presenting large surfaces covered with parallel lines, as in Figs. L and M, and in Fig. 3, or with concentric circles, as in Fig. 2, have been rejected, as, on the whole, not well suited to the investigation of astigmatism. They all have the great disadvantage of dazzling the retina of even the healthy emmetropic eye, and in astigmatism they often prove in a high degree distracting to the patient and annoying to the examiner. The reason of this is apparent when we remember that figures with numerous parallel straight lines are among the best tests known for illustrating the phenomenon of the limitation of visual acuteness dependent on the size of the ultimate percipient elements of the retina, and that, similarly, the

[11] Helmholtz. Physiolog. Optik, Pl. II., Fig. 4.

disk of fine concentric circles is peculiarly the test for irregular refraction, having its seat in the crystalline lens. Used at comparatively short distances from the eye, such diagrams serve perfectly to demonstrate the general phenomena of astigmatism, but they are by far inferior to simpler figures for analyzing and measuring it in practice. Even the triple rings in Figs. S and T have been proved to be much less useful in practice than the diagrams made up of radii.

Since the first publication of these test-diagrams numerous imitations and reproductions of them, more or less varied, have appeared. Diagrams substantially identical with Figs. A and E, but considerably amplified, and drawn upon several different scales, were published in 1868, in Vienna, in the name of Dr. O. Becker,[12] and quite recently Mr. Carter,[13] of London, has described and figured, as original, an arrangement substantially the same as Fig. C, and like it, made to turn upon a dial card. Snellen, from whose first edition of test-types the triple line, Fig. 1, was borrowed, has restored this figure in his third and later editions, and has also substantially adopted the diagram, Fig. B, but he has drawn it with thirty-six radii instead of sixty, and has cut off the lower half of the circle, so as to give a figure like Fig. 4, which has the single advantage of falling within the limits of

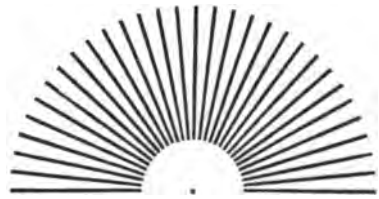

FIG. 4.

the octavo page of his *Test-types*.[14] Other reproductions have appeared, generally without acknowledgment of their origin and for the most part with unimportant changes of scale or arrangement, but none of them present any peculiarity deserving of notice. One test, however, of those which have appeared since the writer's earlier publications, and which have come to his knowledge, is both ingenious and useful, viz., the *Test-types for astigmatism* of the late Dr. O. F. Pray.[15] By the happy device of cutting out portions of the striped sectors

[12] Vier Tafeln zur Bestimmung des Astigmatismus. Wien, 1868.

[13] Practical Treatise on Diseases of the Eye. London, 1875. Fig. 91, p. 575.

[14] Optotypi ad visum determinandum, confecit Herman Snellen, MDCCCLXXV.

[15] Archives for Ophthalmology and Otology, I., I.

from the diagram shown in Fig. L, in the form of letters, Dr. Pray succeeded very perfectly in overcoming the dazzling and confusion which are generally experienced in looking at large surfaces covered with fine parallel lines. By increasing the number of letters constructed in this manner, and drawing them upon an enlarged scale, he produced the well-known and generally approved sheet of letters which bears his name.[16]

[Figs. A, B, and C, illustrating this communication, were originally published of full size (about ten inches in diameter), at Utrecht in 1866 (*Ned. Arch. v. Gen. en Natuurk.*, II., *Verslag Ned. Gasth. v. Oogl.* No. VII.), and thus attained quite a wide circulation. Figs. D and F are reproduced from a paper by the writer in the *American Journal of the Medical Sciences* for January, 1867, in which paper the arrangement shown in Fig. E is also described. Figs. G to O represent test-objects exhibited at the meeting of the *American Ophthalmological Society*, in June, 1867, and appeared in the Transactions of the Society together with Figs. A, B, E, and F. Figs. P to Z, which appear now for the first time, are reduced copies of diagrams engraved about two years ago and exhibited at the present meeting. These reduced diagrams are useful in testing myopes for astigmatism, and may also be used in a lenticular optometer.]

[16] Dr. Pray's Test-types for Astigmatism were first published several months after his death, which occurred in 1869. The sheet of types published by Wm. Wood & Co., of New York, was exhibited at the meeting of the American Ophthalmological Society, in July, 1869, by Dr. H. D. Noyes, of New York, together with the original drawing, a copy of Fig. L, in which a letter was cut from each of the twelve sectors.

II. STEREOSCOPIC DIAGRAMS FOR TESTING BINOCULAR VISION.

The ordinary stereoscopic slides, with photographic pictures, are not well adapted for use as tests of binocular vision and of the binocular perception of solid forms. The relaxation of the accommodation and convergence in using the lenticular stereoscope, and the accurate perspective and perfect reproduction of atmospheric effects and of lights and shadows in the photographic pictures, suffice generally to give the impression of distance and solidity even when identical pictures are placed before the two eyes, and in many cases also when the right and left hand pictures are interchanged. Engraved geometrical figures, such as were furnished with the earlier stereoscopes, are very striking objects to persons who enjoy perfect binocular vision, but the drawing is often so suggestive of the solid form as to make it difficult to decide whether the true stereoscopic effect is perceived by a person whose power of binocular vision is the subject of investigation. The writer has, from time to time during the past ten years, constructed diagrams especially for use as tests of binocular vision; a few of these are now presented as examples of such forms as have been found useful in practice.

(1.) *Diagrams made up of two wholly dissimilar pictures.*

Figures 1 and 2, to a person with fair binocular vision, show the two figures facing each other and in the act of boxing. Owing, however, to the absence of corresponding points in the two pictures, upon which the two eyes may rest, the figures appear unsteady, and move towards and away from each other in a somewhat capricious manner. If but one figure is seen, it is easy to identify it by its attitude and by the way it faces. In Fig. 1 the two figures appear much nearer to each other than upon the card. In Fig. 2 they appear to be transposed.

(2.) *Diagrams made up of figures in part identical, but which by superposition in the stereoscope produce a third figure different from either.*

Fig. 3, as seen by the right eye, shows the letter L, by the left eye the letter F, by both eyes together the letter E.

Figure 4 is the same as Figure 3, but with the letters transposed.

(3.) *Mirror effect produced by combining a white with a black surface.*

In Fig. 5 each ring fuses with the peripheral portion of the corresponding black disk, giving rise to the illusion of a mirror set in a black ring. The pictures, as seen by the right and left eye respectively, are identified by the relative position of the ring and disk.

Figure 6 is the same as Figure 5, but with the cuts transposed.

(4). *Diagrams illustrating the stereoscopic effects of difference in distance, obliquity of position, and difference in size and form.*

In Figure 7 the two pairs of disks are fused in the stereoscope into two disks, one above the other. The disk which corresponds to the more widely separated pair appears to be farther distant than the other from the observer; it also appears conspicuously *larger*, a necessary consequence of the illusion of greater distance when unaccompanied by any corresponding diminution in the size of the retinal image. This illusion of difference in size is very striking, and is often seized by the patient when the difference in distance is imperfectly or more tardily recognized.

Figure 8 is the same in principle as Figure 7, but differs from it in the arrangement of the rings.

Figure 9, showing three rings, and Figure 10, in which the drawing suggests something of the solid form, sometimes give positive results when the other tests have proved indecisive.

Figure 11 shows one arrow pointing forward, the other backward.

In Figure 12, representing two possible aspects of a quadrilateral as seen by the two eyes, one of the figures is a square and the other a rectangle of the same height, but of less horizontal measurement. On fusing the two figures in the stereoscope, the resultant figure assumes an oblique position as if turned upon a vertical axis. Although both of the component figures are rectangular, the combination figure is not a rectangle, but has its nearer side conspicuously shorter than its farther side.

Figures 13 and 14 represent similarly two possible aspects of an ellipse, one of these aspects being in each case a circle.

Figures 15 and 16, ellipses symmetrically arranged in pairs, show a rotation of the resultant figure upon a horizontal axis, and also a change in its apparent shape, which in Figure 15 is that of a long ellipse, and in Figure 16 approximates a circle. These effects may be infinitely and strikingly varied by arranging the two figures to turn symmetrically, each upon a central pivot.

[The cuts, Figs. 1 to 16, illustrating this section, are printed upon separate cards for use in the stereoscope, and accompany this number of the *Transactions*.]

III. A NEW MODIFICATION OF LORING'S OPHTHALMOSCOPE.

Ophthalmoscopes fitted with a single or double disk, containing a number of lenses designed to facilitate the inspection of the fundus in the erect image, are among the earlier forms of the instrument.[1] Equally old is the idea of using the ophthalmoscope for measuring the refraction,[2] and the series of correcting glasses furnished with some of the older instruments was quite sufficient for such rough determinations as were considered practicable.[3] The double-disk attachment of Rekoss to the original Helmholtz ophthalmoscope, and the pocket ophthalmoscope of Stellwag with its single disk of eight openings,[4] exhausted most of the possibilities in the way of mechanical adjustments, but neither of these devices was intended or sufficed for accurate measurements of refraction.

The first practical ophthalmoscope designed for the measurement

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[1] Helmholtz's Ophthalmoscope with Rekoss' double disk, each disk with five openings and four concave lenses, giving a possible range of combinations between $-\frac{1}{13}$ and $-\frac{1}{3}$.

Donders' modification of Epkens' ophthalmoscope, with a single disk of seven openings containing the series + 25, + 12.5, + 5, — 6.25, — 10, and — 16.6 *metric units.*

[2] Der Augenspiegel als Optometer, von Prof. Jaeger, Jr. (Oesterr. Zeitschr. für pract. Heilkunde, 1856).

[3] Jaeger's larger ophthalmoscope was furnished with the series $-\frac{1}{2}$, $-\frac{1}{3}$, $-\frac{1}{4}$, $-\frac{1}{5}$, $-\frac{1}{6}$, $-\frac{1}{8}$, $-\frac{1}{10}$, $-\frac{1}{12}$, $+\frac{1}{12}$, $+\frac{1}{8}$, $+\frac{1}{6}$, $+\frac{1}{2}$.

Early in 1866 the writer had made, by Nachet of Paris, a set of ophthalmoscope mirrors with clips admitting of the employment of the entire series of test-glasses in the trial case, both spherical and cylindrical.

A device similar to the last, but in an improved form, was exhibited by Dr. H. D. Noyes, at the meeting of the American Ophthalmological Society for 1869, and is figured in the Transactions of that year (p. 59). It is the best instrument known to the writer for obtaining a perfect view of the fundus of an astigmatic eye in the erect image.

At the meeting of the American Ophthalmological Society for 1873 (Trans. 1873), Dr. Knapp stated that, "some years before Dr. Loring constructed his instrument, he [Knapp] had a complete collection of small trial-glasses made, which he could insert into an ordinary small (Liebreich) ophthalmoscope.

[4] Containing the series $+\frac{1}{8}$, $+\frac{1}{6}$, $+\frac{1}{12}$, $-\frac{1}{12}$, $-\frac{1}{10}$, $-\frac{1}{8}$, $-\frac{1}{4}$, $-\frac{1}{2}$. For a description and figure of this ophthalmoscope, see Pilz, Lehrb. der Augenheilk., S. 146.

of the refraction is, unquestionably, that of Loring,[5] which was first made with three interchangeable disks, and the introduction of this instrument marks also the beginning of the general employment of the objective method in the quantitative diagnosis of ametropia. Loring's first ophthalmoscope, though quite sufficient for the practical requirements of the ophthalmoscopist, has been considerably modified in form by its inventor and others,[6] and, as now constructed, is a much more elegant and more convenient instrument than it was in the beginning.

The ophthalmoscope now shown is based upon one of the earlier forms of Loring's instrument,[7] and was made for the writer, in the summer of 1876, by Hunter of New York. The hinged mirror is taken from a later ophthalmoscope also by Loring, and made by Hunter.[8] The especial feature in the instrument taken as a model

[5] Trans. Am. Ophth. Soc., 1869; Am. Jour. Med. Sciences, Jan., 1874; Trans. Am. Ophth. Soc., 1874; Determination of the Refraction of the Eye by Means of the Ophthalmoscope, by E. G. Loring, M.D., N. Y., 1876; Rep. Fifth Internat. Ophth. Congress, 1876.

[6] These changes have consisted chiefly in collecting the glasses from Loring's original three disks into a single disk or two disks. Thus, Cohn (Klinische Monatsblätter, Oct., 1872) placed Loring's whole series of glasses in a single disk of inconveniently large size; de Wecker (Ibid., Aug., 1873) placed the same series in a single small disk, but by so doing made the glasses inconveniently small; and Loring (Am. Jour. Med. Sciences, Jan., 1874), by an ingenious and novel arrangement, mounted the twenty-three glasses in one disk, but in two concentric circles, thus solving the problem of mounting a large series of conveniently large glasses in a conveniently small disk. Knapp also having had one of Loring's instruments with the three disks in daily use during about four years, produced a modification of it in which nearly the same series of lenses was mounted in two disks instead of three (Trans. Am. Ophth. Soc., 1873; Archiv. for Ophthalmol. and Otol., III., II., p. 2). As an incident to this construction with two disks it was possible to use some of the weaker glasses of each disk to fill the large gaps between the higher numbers of the other, but the instrument did not realize the possibilities of a combination ophthalmoscope, either in economy of lenses or regularity of intervals.

[7] Loring, Determination of the Refraction of the Eye by Means of the Ophthalmoscope, p. 10, Fig. 6. Also Rep. Fifth Internat. Ophth. Congress, p. 83, Fig. 4. This arrangement of twelve selected glasses in a single disk of thirteen openings, was made by Loring as a cheap and simple ophthalmoscope for students, and the instrument has been made and kept on sale by Hunter since 1871.

[8] Rep. Fifth Internat. Ophth. Congress, p. 85, Fig. 6. This mirror, mounted in a cell which is arranged to rotate in its own plane, appears to the writer to be on the whole preferable to the tilting mirror which is furnished with Loring's later instruments.

is the rotating disk of thirteen openings, in which are mounted twelve correcting glasses, six of which are convex and six concave. The writer has placed in this disk a series of lenses in regular progression, and has added a second disk, of five somewhat larger openings, in which four additional glasses are mounted. The construction of the instrument, as thus modified, is shown in Fig. 1, with a series of lenses based upon the unit lens of twenty-four inches (English) focus.[9]

FIG. 1.

In the principal disk of thirteen openings, each five millimetres in diameter, are set twelve glasses giving the series,

$$O, \begin{matrix} + 1, 2, 3, 4, 5, 6, \\ - 1, 2, 3, 4, 5, 6; \end{matrix}$$

the second disk, of five openings, each six and a half millimetres in diameter, contains the additional numbers,[10]

$$O, \begin{matrix} + \tfrac{1}{2}, 7, \\ - \tfrac{1}{2}, 7, \end{matrix}$$

either of which may be superimposed at will upon any one of the lenses or upon the vacant opening in the principal disk. Thus, by adding + 7 or − 7, the series is extended on the one hand

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[9] This is the unit-measure long ago proposed by Donders for indicating the range of accommodation; it is the No. 24 of the French scale, with radii of curvature equal to twenty-four Paris inches, and a focal length of almost exactly twenty-four English inches; it may, therefore, be most properly designated as $\frac{1}{24}$ *Eng.* The series of lenses is thus made up from numbers of the French scale, as follows:

$$O, \begin{matrix} + \frac{1}{24}, \frac{1}{12}, \frac{1}{8}, \frac{1}{6}, \frac{1}{4.8}, \frac{1}{4}, \\ - \frac{1}{24}, \frac{1}{12}, \frac{1}{8}, \frac{1}{6}, \frac{1}{4.8}, \frac{1}{4}. \end{matrix}$$

[10] Actually,

$$O, \begin{matrix} + \frac{1}{48}, \frac{1}{3\frac{1}{7}}, \\ - \frac{1}{48}, \frac{1}{3\frac{1}{7}}. \end{matrix}$$

of numbers from the French scale.

This series of glasses may be slightly changed, in the interest of the instrument maker, by substituting + 6 and − 6 for + 7 and − 7; the second disk will then contain

$$O, \begin{matrix} + \frac{1}{48}, \frac{1}{4}, \\ - \frac{1}{48}, \frac{1}{4}. \end{matrix}$$

and the range of this instrument will be from + 12 (= + ½) to − 12 (= − ½),

to + 13, and on the other to — 13; and similarly, by using the numbers + ½ and — ½, we halve the common interval of unity between the limits + 7 and — 7.[11]

FIG. 2.

A second arrangement of lenses, based upon the *metre-lens* as the unit, is shown in Fig. 2. The numbering of the glasses in the principal disk is the same as in the former arrangement, but with changed values based upon the change in the unit.[12] The second disk contains the numbers,

$$O, \begin{matrix} + 7, 14, \\ - 7, 14, \end{matrix}$$

which, combined with the numbers in the principal disk, give a complete series of forty-one whole numbers, ranging from + 20 to — 20.

Both of these arrangements give series of glasses more extensive than the ordinary range of ametropia, and with gradations minute enough, it is believed, to satisfy the actual needs of practical ophthalmoscopists. The unit $\frac{1}{24}$,

with half-unit intervals between + 6½ ($= \frac{1}{3\frac{1}{2}\frac{1}{3}}$) and — 6½ ($= -\frac{1}{3\frac{1}{2}\frac{1}{3}}$). All but one of the numbers (No. 5 $= \frac{1}{2\frac{1}{8}}$) will then correspond exactly with numbers belonging to the French scale as found in commerce.

If a smaller interval than $\frac{1}{24}$ is demanded to meet the requirements of an especially acute observer, the two interpolating lenses may be taken of such values as to divide the common interval $\frac{1}{24}$ into three equal parts. These lenses will then be either + $\frac{1}{72}$ and — $\frac{1}{72}$, + $\frac{1}{72}$ and + $\frac{1}{36}$, or — $\frac{1}{72}$ and — $\frac{1}{36}$, as may be preferred.

[11] The unit $\frac{1}{48}$ may be taken also as the basis of the system and so be used as the common interval throughout the scale. In this case we increase slightly the size of the principal disk, which will then contain seventeen openings instead of thirteen, and mount on it the numbers,

$$O, \begin{matrix} + 1, 2, 3, 4, 5, 6, 7, 8, \\ - 1, 2, 3, 4, 5, 6, 7, 8; \end{matrix}$$

the second disk will then contain the numbers,

$$O, \begin{matrix} + 8, 16, \\ - 8, 16, \end{matrix} \quad \text{or else,} \quad O, \begin{matrix} + 9, 17, \\ - 9, 17, \end{matrix}$$

; may be preferred, or as may be more easily executed.

[12] The No. 40 ($\frac{1}{40}$) of the French scale, which, with radii of curvature of forty aris inches, is a very close approximation to a lens of one metre focus, may conveniently, and with insignificant error, be taken as the *metre-lens*. The series, as

with the half-unit introduced by interpolation between the limits + 7 and — 7, has proved convenient in the writer's practice, but opinions may legitimately be divided as regards the convenience of this arrangement as compared with one based upon the unit $\frac{1}{48}$.[13] Either of these units appears to the writer to be a more convenient measure than the *metre-lens*, although the preponderance of opinion in Europe appears now to be in favor of the latter. If the *metre-lens* is taken as the unit, the use of the half-unit interval will probably be found inconvenient by the larger number of observers, and it will be of scarcely more than occasional utility to the more expert. In the metric arrangement, therefore, the half-unit interval may be most conveniently introduced by interpolation, and it will be needed only in that part of the scale which lies between the limits + 7. and — 7.

FIG. 3.

Astigmatism, in the eye of the observer, is so serious a hinderance to rapid and accurate ophthalmoscopic investigations[14] as to call for some arrangement by which the glass or glasses needed for its correction, in any particular case, may be made a part of the instrument. Probably the most convenient mounting for these glasses is in a plate (Fig. 3) covering the second disk, and turning independently upon its

given in the text, will then be represented by numbers from the French scale, as follows: in the principal disk,

$$O, \begin{matrix} + \frac{1}{40}, \frac{1}{20}, \frac{1}{13.3}, \frac{1}{10}, \frac{1}{8}, \frac{1}{6.6}, \\ - \frac{1}{40}, \frac{1}{20}, \frac{1}{13.3}, \frac{1}{10}, \frac{1}{8}, \frac{1}{6.6}, \end{matrix}$$

and in the second disk,

$$O, \begin{matrix} + \frac{1}{56}, \frac{1}{28}, \\ - \frac{1}{56}, \frac{1}{28}. \end{matrix}$$

The intervals of this series, as in that based upon the unit $\frac{1}{24}$, may be halved between the limits + 7. and — 7. by the addition of interpolating lenses + .5 and — .5 to the second disk, which will then have seven openings instead of five. These lenses may also be taken of values to subdivide the common interval by three, should any one desire to test such refinements.

[13] See note 11.

[14] The correction of astigmatism is of importance to all observers with optical instruments, as low a degree as $\frac{1}{60}$ materially detracting from the sharpness and quickness of preception, and so confining an otherwise excellent observer to an inferior rank. This is especially true in the case of astronomical observers, who must combine accuracy with quickness of perception in the highest degree. The correcting-glass, which in most cases may be a simple cylindrical lens, either convex or concave, may be set in a cap or short tube, and placed over the eye-piece at the pleasure of the observer.

pivot. It is well to make these glasses a little larger than those of the disk upon which they are superimposed, and they are shown in the figure of a diameter of eight millimetres, the lenses of the second disk, those of the principal disk, and the opening in the mirror measuring six and a half, five, and three and a half millimetres respectively. A fixed covering plate (Fig. 4) may be used in the place of the revolving plate whenever the correcting glasses for astigmatism are not required. The principal disk hardly needs to be covered, as the glasses are perfectly accessible, and can be easily wiped if they become soiled.

A ratchet mechanism for accurately centering the lenses, as in the original Rekoss disks and in most of the recent disk-opthalmoscopes, is often very convenient, by enabling the observer to change the glasses without removing the instrument from his eye.[15]

Figs. 5 and 6 show the ophthalmoscope, fitted with a fixed covering plate, and with the revolving cover, in which two correcting glasses are set. Its weight, exclusive of the long handle, is exactly twenty-eight grammes.

[This ophthalmoscope, substantially as described in this communication, was made in the summer of 1876, and was shown to many members of the International Opthalmological Congress in attendance at the meeting of that body in New York. In consequence, however, of the absence of the writer from the final session of the Congress, it was not publicly shown, and was not noticed in the Transactions. This explanation is called forth by the fact that the writer has but lately (July, 1878) become acquainted with a new and as yet undescribed combination ophthalmoscope by Dr. Loring, which, had it existed earlier, would have rendered this one superfluous. The two instruments, as might be expected in the case of independent productions, differ in form and in some matters of detail—differences which are perhaps sufficient to excuse this somewhat tardy publication.]

[15] A rather long handle, as shown in Fig. 6, is much more convenient than a shorter one. The disk is, however, not easily reached by the finger of the hand holding the instrument. This inconvenience has been quite ingeniously overcome by Loring, in an instrument of which no account has yet appeared in print, by cutting teeth in the circumference of the disk, and thus making it articulate with a second toothed wheel of the same or lesser size placed below it upon the handle.

FIG. 4.

FIG. 5.

FIG. 6.

4. IMPROVED SERIES AND ARRANGEMENTS OF THE GLASSES OF THE TRIAL CASE FOR MEASURING REFRACTION.

The older trial cases are mere collections, often very incomplete, of the glasses ordinarily kept on sale. The most complete of these, that of Nachet, of Paris, is based on the unit glass of one inch,[1] and contains thirty-two numbers, ranging from $\frac{1}{72}$ to $\frac{1}{2}$, with irregular intervals varying in value from $\frac{1}{300}$ $(= \frac{1}{60} - \frac{1}{72})$ to $\frac{1}{18}$ $(= \frac{1}{2} - \frac{1}{2\frac{1}{4}})$.

The inconvenience of a series thus casually brought together was early recognized, and, in 1864, Zehender[2] proposed for adoption the unit $\frac{1}{48}$, and suggested that by making glasses of the plano-convex and plano-concave form they may be used in combination, and thus the whole series, from $\frac{1}{48}$ to $\frac{1}{2}$, may be made up from ten pairs of convex and ten of concave glasses. For more accurate measurements he suggested the use of a glass of ninety-six inches focus, as a half-unit to be used in connection with the other combinations.

In 1866, Burow, Senior,[3] proposed the untit $\frac{1}{60}$, and suggested that a regular series, based upon this unit, could be selected, with comparatively unimportant error, from the glasses found in the trial cases as made up by Nachet and others. Burow also reconstructed the *règle à calcul* of Javal to correspond with the new unit.

At the meeting of the International Ophthalmological Congress of 1867, Javal advocated the adoption of $\frac{1}{48}$ as the unit, and called attention to the fact that this glass, which is ground with radii of curvature of 48 Paris inches, has a focal length of almost exactly 120 cm.[4] The advantages claimed for the unit $\frac{1}{48}$ are its con-

[1] The unit lens in the old French system is a double convex lens with radii of curvature equal to one Paris inch, which, with glass of an index of refraction equal to 1.5, would have a focal length also of one Paris inch. But the index of refraction of crown glass is actually about 1.53, which gives a focal length for this unit lens of about .94 Paris inch. Now, it happens that the value of the English inch, expressed in Paris inches, is also about .94, from which relation it follows that the number which expresses the radius of curvature in Paris inches expresses approximately the focal length in English inches; in fact, this approximation is very close, and the error so small as to be practically inappreciable.

[2] Klinische Monatsblätter für Augenheilkunde, IV., p. 1.

[3] Archiv für Ophthalmologie, XII., ii., p. 309.

[4] This corresponds to a focal length of one metre for the glass ground with two spherical surfaces of forty Paris inches radius, and is so nearly exact that the No. 40 of the French scale may be, and is, used by opticians as the equivalent of the

venient size, its conformity to the numbers of glasses as ordinarily manufactured, and to Donders' measure, $\frac{1}{24}$, which has become familiar through his writings, and the fact that the numbers 48 and 120 are both divisible by six and by eight, without remainders, and that 120 is similarly divisible by ten also.

At the same meeting, Nagel dissented from Javal's recommendation, and proposed as the unit a lens of one metre focal length, but with half-unit intervals between the limits .5 and 7. The whole series as recommended by Nagel consisted of 27 numbers.

The propositions of Javal and Nagel were referred by the Congress to a committee charged to report at Berlin in 1871.

At the meeting of the Congress in 1872, the committee presented a majority report favoring the adoption of $\frac{1}{96}$ as the unit, which is recognized as the practical equivalent of a lens of 240 cm. focal length. The whole series from 1 ($= \frac{1}{96}$) to 48 ($= \frac{1}{2}$) contains forty-eight numbers, but the committee proposed to reduce them to thirty-six by omitting alternate numbers above 24 ($= \frac{1}{4}$).

Nagel, still dissenting from the majority of the committee, has ever since advocated the adoption of the *metre lens* as the unit, and has at length succeeded in introducing the metric series into commerce, and into very common use, at least in Europe. With the distinguished approval of Donders, the metric trial case is now made up of quarter-units, between 25 and 3., half-units between 3. and 6., units between 6. and 16., and double units between 16. and 20. Thus the eighty numbers of the full series are reduced to thirty.

The writer has long been of the opinion that a smaller measure of refraction than is afforded by either of these systems is demanded in the interest of accurate work, and it is now suggested that an interval equal to one-tenth of the metric unit (about $\frac{1}{400}$ of the old French scale), or one-fourth of the unit $\frac{1}{96}$ ($= \frac{1}{384}$), is not too small to be of frequent use in careful measurements.[6] A series of 200 or of 192

metre lens. An experimental confirmation of the substantial accuracy of this assumed value has been recently given by Horstmann. (Klin. Monatsb. für Augenheilk., XVI., p. 290.)

[6] In an old trial case, made for the writer by Nachet in 1866, the initial glass is $\frac{1}{96}$, followed by $\frac{1}{84}$, $\frac{1}{72}$, $\frac{1}{60}$, $\frac{1}{48}$, $\frac{1}{42}$, $\frac{1}{36}$, $\frac{1}{30}$, $\frac{1}{24}$, etc., the intervals being $\frac{1}{672}$, $\frac{1}{504}$, $\frac{1}{360}$, $\frac{1}{336}$, $\frac{1}{252}$, $\frac{1}{180}$, $\frac{1}{120}$, etc. These small intervals, though not uniform, have proved very useful. They are easily utilized by making up a compound lens approximating the value required, in which one of these weaker lenses, either convex or concave, is introduced as a factor, and then exchanging the weaker lens for that next above or below it in the series.

numbers is, however, quite out of the question, owing as well to the cost and cumbrousness of so enormous a trial case, as to the fact that the grinding-tools for such a series are not in existence, and are not likely to be made. Nor can a series based upon so small a unit be compressed within convenient limits by any scheme for omitting an increasing number of units in the higher intervals. There remains then only the plan, long ago suggested by Zehender, of using glasses in combination, and for greater convenience, it may be well to limit such combinations to two glasses of a kind, and these of the same sign, *plus* or *minus*.

The following scheme is suggested for a full metric series of 210 numbers,[6] ranging from .1 to 21., together with such cylindrical glasses as may be requisite for the accurate investigation of astigmatism.

Series A.—29 numbers: common interval, .1; range, .1 to 21.

Spherical glasses, in pairs, convex and concave.—Nos. .1 .2 .3 .4 .5 .6 .7 .8 .9 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20.

Cylindrical glasses, single, convex and concave.—Nos. .1 .2 .3 .4 .5 .6 .7 .8 .9 1. 2. 3. 4. 5. 6. 7. 8.

Spherical glasses,	29 × 2 × 2 =	116
Cylindrical glasses,	17 × 2 =	34
Total,		150

[6] The manufacture of the glasses in this series between the limits .1 and .9 would appear at first sight to involve the preparation of a large number of special grinding-tools. This is, however, by no means absolutely necessary, for all the nine glasses may be easily and accurately made by using plane surfaces in connection with the convex or concave spherical curves of Nos. 1., .8, and .6. Taking the lens with double spherical surfaces of 40 Paris inches radius as the equivalent of the *metre lens*, the Nos. .8 and .6 will have surfaces of 50 and 66⅔ inches radius respectively. Combining these curves severally with plane surfaces, we obtain Nos. .5, .4, and .3. Nos. .9 and .7 are double spherical lenses with radii of 40 and 50, and 50 and 66⅔ inches, and Nos. .2 and .1 are similarly menisci with *plus* and *minus* surfaces of 40 and 66⅔, and 40 and 50 inches radii respectively.

The cylindrical lenses, which for convenience of manufacture are always made in the plano-cylindrical form, will have the following radii of curvature in Paris inches: No. 1., 20 inches; No. .9, 22⅔ inches; No. .8, 25 inches; No. .7, 28⅔ inches; No. .6, 33⅓ inches; No. .5, 40 inches; No. .4, 50 inches; No. .3, 66⅔ inches; No. 2, 100 inches; and No. .1, 200 inches. Cylindrical glasses of these radii may be made with the greatest cheapness, and with all the accuracy desirable, by bending sheets of polished plate glass by the aid of heat, as is done on a large scale in the arts in preparing curved glass for windows. The bent glass is cut to the size required for a single lens, and a plane or spherical surface is ground upon either the convex or concave side, at pleasure.

The number of glasses in this series may be considerably reduced, without departing from the spirit of the metric system, by dropping alternate numbers in the decimal part of the scale, and so making the initial glass and the common interval equal to .2 instead of .1, as follows:

Series B.—19 numbers: common interval, .2; range, .2 to 22.

Spherical glasses, in pairs, convex and concave—Nos. .2 .4 .6 .8 1.0 1.2 1.4 1.6 1.8 2. 4. 6. 8. 10. 12. 14. 16. 18. 20.

Cylindrical glasses, single, convex and concave.—Nos. .2 .4 .6 .8 1. 2. 3. 4. 5. 6. 7. 8.

Spherical glasses,	19 × 2 × 2 = 76
Cylindrical glasses,	12 × 2 = 24
Total,	100

This number may be still further reduced, though with a considerable sacrifice of convenience, by using convex and concave glasses together, in dual combinations; the series will then contain of

Spherical glasses, single, convex and concave,	20 × 2 = 40
Cylindrical glasses, single, convex and concave,	12 × 2 = 24
Total,	64

The interval one-fourth of the metric unit (.25 or about $\frac{1}{160}$ of the old French scale) appears to the writer to be less convenient in practice than the interval .2, besides being less in the spirit of the decimal system. Lenses ground upon this scale are, however, now readily procurable, and a set of seventeen glasses, selected from the new trial cases of Nachet and other European opticians, is sufficient to make up a full series between the limits .25 and 22.

Series C.—17 numbers: common interval, .25; range, .25 to 22.

Spherical glasses, in pairs, convex and concave.—Nos. .25 .50 .75 1. 1.25 1.50 1.75 2. 4. 6. 8. 10. 12. 14. 16. 18. 20.

Cylindrical glasses, single, convex and concave.—Nos. .25 .50 .75 1. 1.25 1.50 1.75 2. 4. 6. 8.

Spherical glasses,	17 × 2 × 2 = 68
Cylindrical glasses,	11 × 2 = 22
Total,	90

Or, slightly vayring the selection:

Spherical glasses, in pairs, convex and concave.—Nos. .25 .50 .75, 1. 1.25 1.50 1.75 2. 2.25 2.50 2.75 3. 6. 9. 12. 15. 18.

Cylindrical glasses, single, convex and concave.—Nos. .25 .50 .75 1. 1.25 1.50 1.75 2. 2.25 2.50 2.75 3. 6.

Spherical glasses,	17 × 2 × 2 =	68
Cylindrical glasses,	13 × 2 =	26
Total,		94

Or, using convex and concave glasses in the same combination:

Spherical glasses,	18 × 2 =	36
Cylindrical glasses,	12 × 2 =	24
Total,		60

The unit $\frac{1}{96}$ of the old French scale, as recommended by the Committee of the International Ophthalmological Congress of 1872, may be taken as the basis of a combination series without going beyond the numbers which can be furnished by any manufacturer who is provided with tools for grinding lenses upon the old French system, as follows:—

Series D.—13 numbers: common interval, $\frac{1}{96}$; range $\frac{1}{96}$ to $\frac{1}{12}$.

Spherical glasses, in pairs, convex and concave.—

Nos.	1,	2,	3,	4,	5,	6,	7,	8,	16,	24,	32,	40,	48.
	$\frac{1}{96}$	$\frac{1}{48}$	$\frac{1}{32}$	$\frac{1}{24}$	$\frac{1}{19.2}$	$\frac{1}{16}$	$\frac{1}{13.7}$	$\frac{1}{12}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{2.4}$	$\frac{1}{2}$

Cylindrical glasses, single, convex and concave.—

Nos.	1,	2,	3,	4,	5,	6,	7,	8,	16.
	$\frac{1}{96}$	$\frac{1}{48}$	$\frac{1}{32}$	$\frac{1}{24}$	$\frac{1}{19.2}$	$\frac{1}{16}$	$\frac{1}{13.7}$	$\frac{1}{12}$	$\frac{1}{8}$
or,	1,	2,	3,	4,	8,	12,	16.		
	$\frac{1}{96}$	$\frac{1}{48}$	$\frac{1}{32}$	$\frac{1}{24}$	$\frac{1}{12}$	$\frac{1}{8}$	$\frac{1}{8}$		

Spherical glasses,	13 × 2 × 2 =	52
Cylindrical glasses,	9 × 2 =	18
Total,		70

Or, *Spherical* glasses,	13 × 2 × 2 =	52
Cylindrical glasses,	7 × 2 =	14
Total,		66

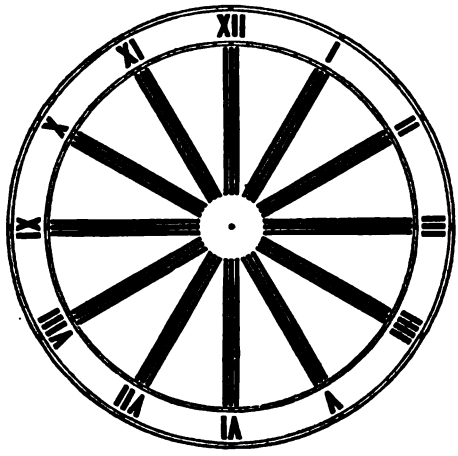
Or, using convex and concave glasses in the same combination—

Spherical glasses,	14 × 2 =	28
Cylindrical glasses,	7 × 2 =	14
Total,		42

This series may be made available for finer determinations by adding to it a single convex and concave glass of the values $+\frac{1}{192}$ and $-\frac{1}{192}$. The fractional numbers $\frac{1}{16.5}$, $\frac{1}{18.7}$, and $\frac{1}{3.4}$ may be easily and correctly made by grinding the glasses with surfaces of unequal radii, viz., 24 and 16, 16 and 12, and 3 and 2 Paris inches respectively. Of the cylindrical glasses the second list contains no fractional or unusual numbers.

Trial glasses, to be used in combinations as here suggested, should be set in metallic rings, such as were long ago introduced by Nachet. These settings have a thin projecting rim, like the flange on the wheel of a railway carriage, which is in the same plane with the most prominent part of one of the surfaces of the glass. Two glasses may thus be held with their rims in contact, and the two may be placed together in a single rather broad groove in the trial frame.[1] A second broad groove suffices in the same way to hold any combination of two cylindrical glasses that may be needed to correct any grade of astigmatism. These two broad grooves are separated by an interval of about four millimetres, in which interval an intermediate groove may be cut. The whole system of grooves, with their separating and retaining ridges, occupies a width of about twelve millimetres, and the weight of the trial frame, substantially made of hammered brass or nickel silver, is about twenty-five grammes. The ordinary double convex and double concave lenses are thinner than plano-spherical lenses of the same diameter, as suggested by Zehender, and are therefore to be preferred. It is also true that the thickness of any combination of the glasses in the trial case, when set nearly or quite in contact with each other, is but little greater than that of a single glass of the same formula.

[1] The writer has used for a dozen years past a trial frame made with a broad groove holding two of the glasses from Nachet's trial case, and has found it very convenient.



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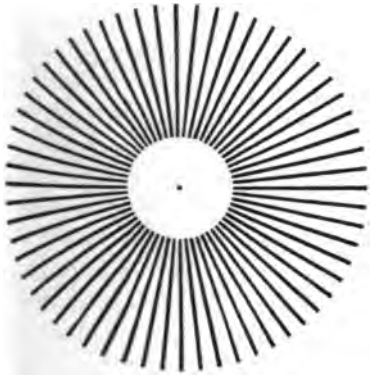

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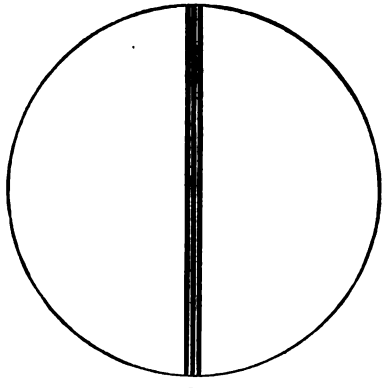

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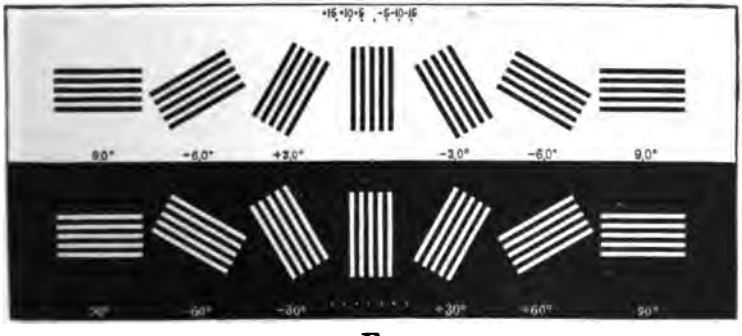

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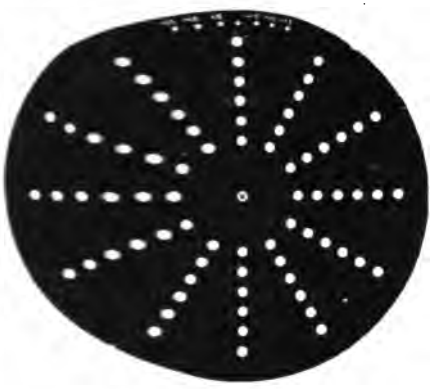

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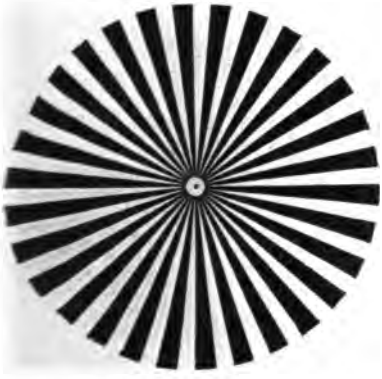

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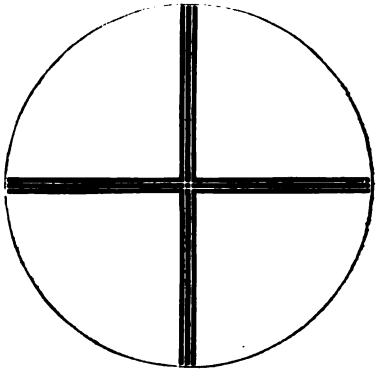

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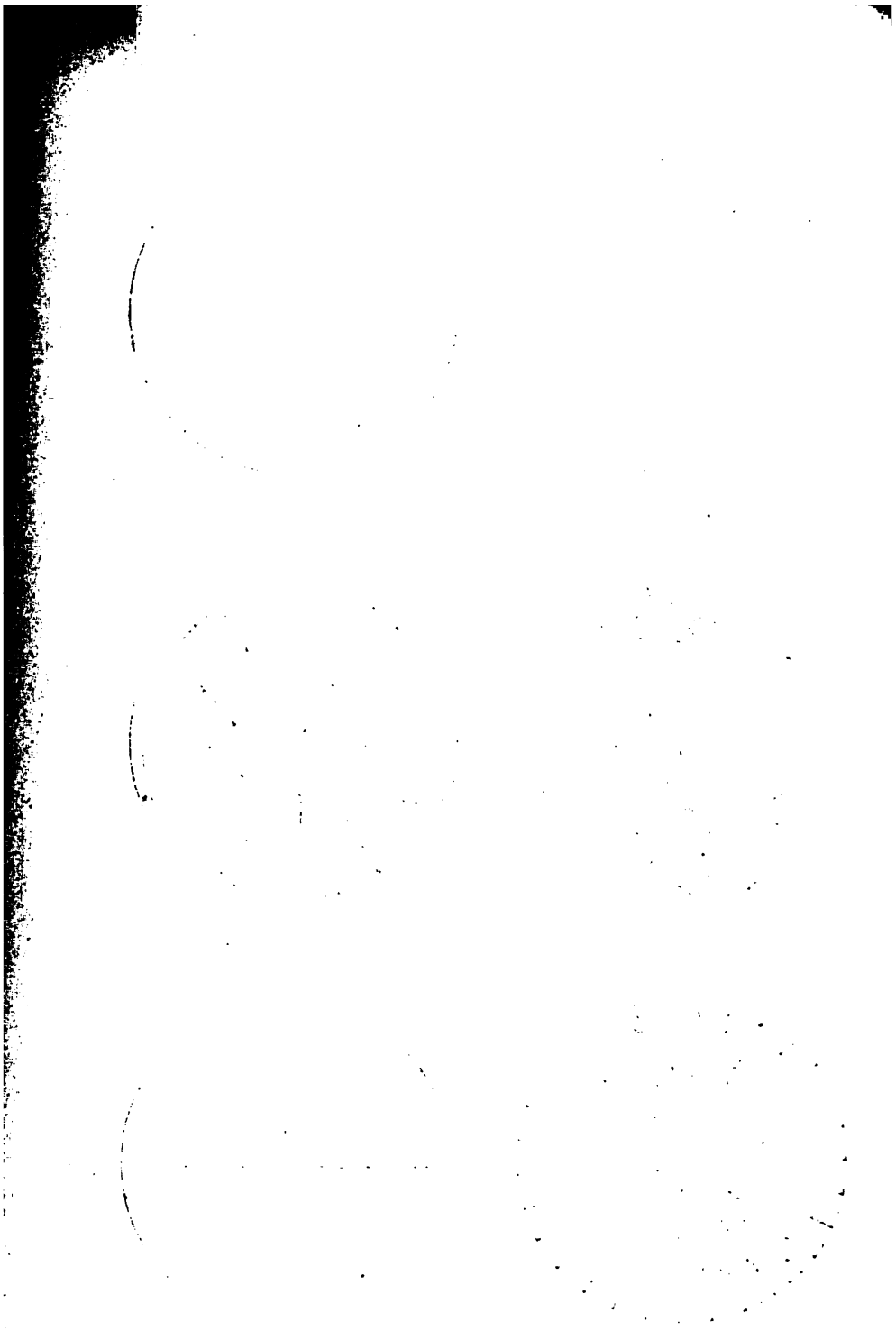

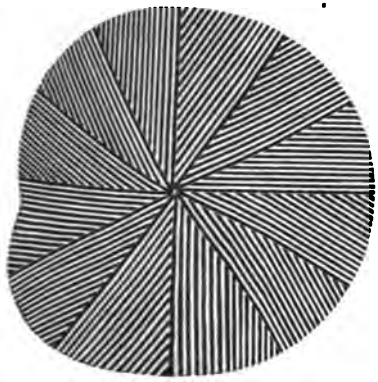

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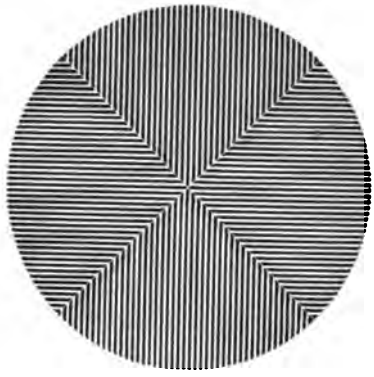

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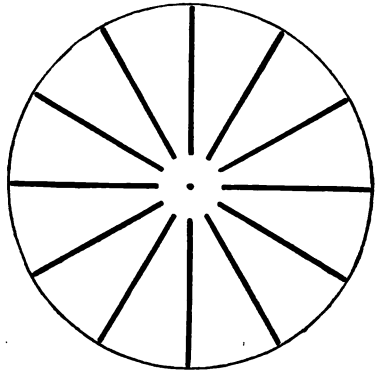

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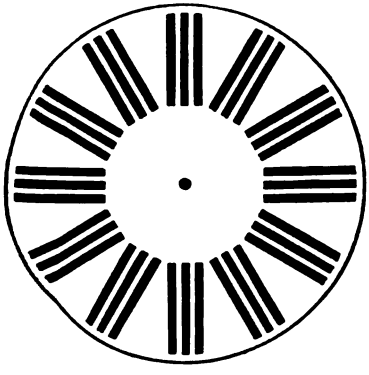

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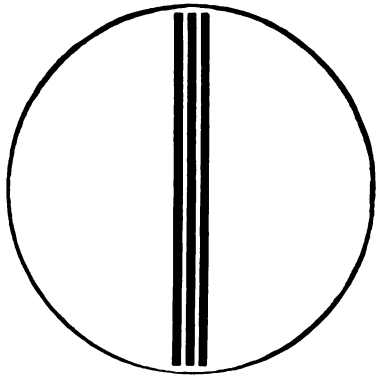

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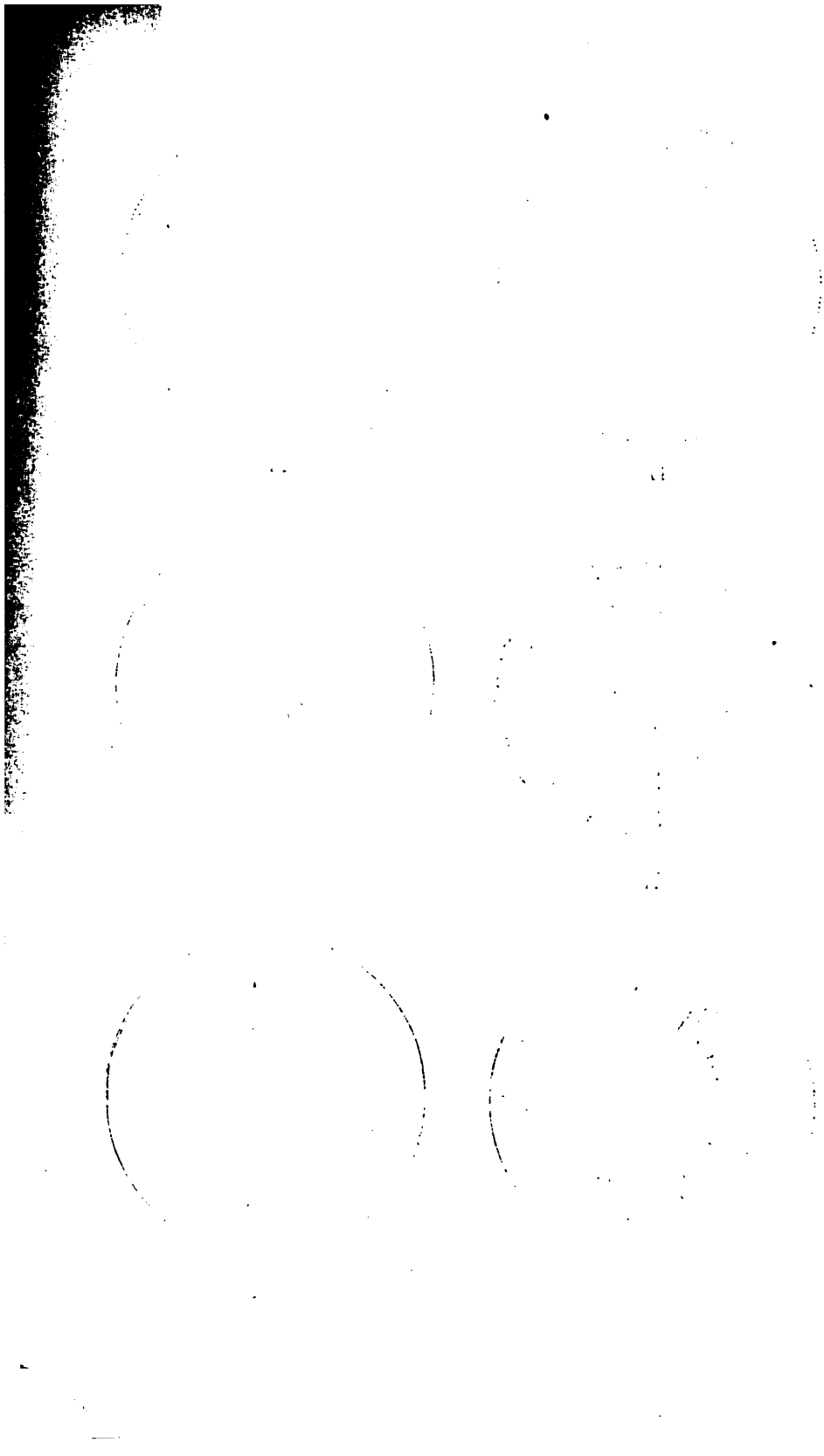

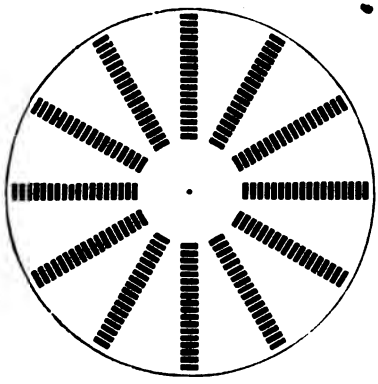

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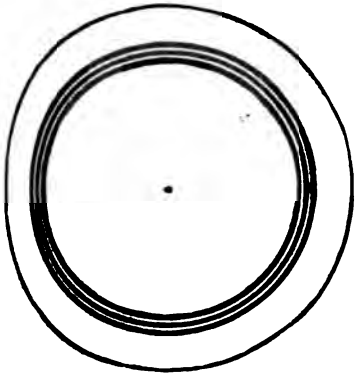

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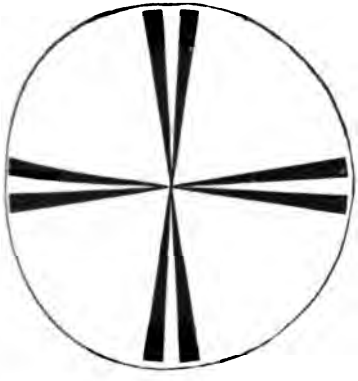

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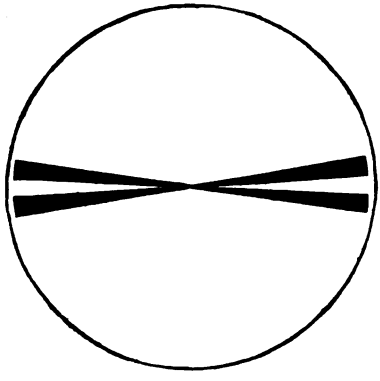

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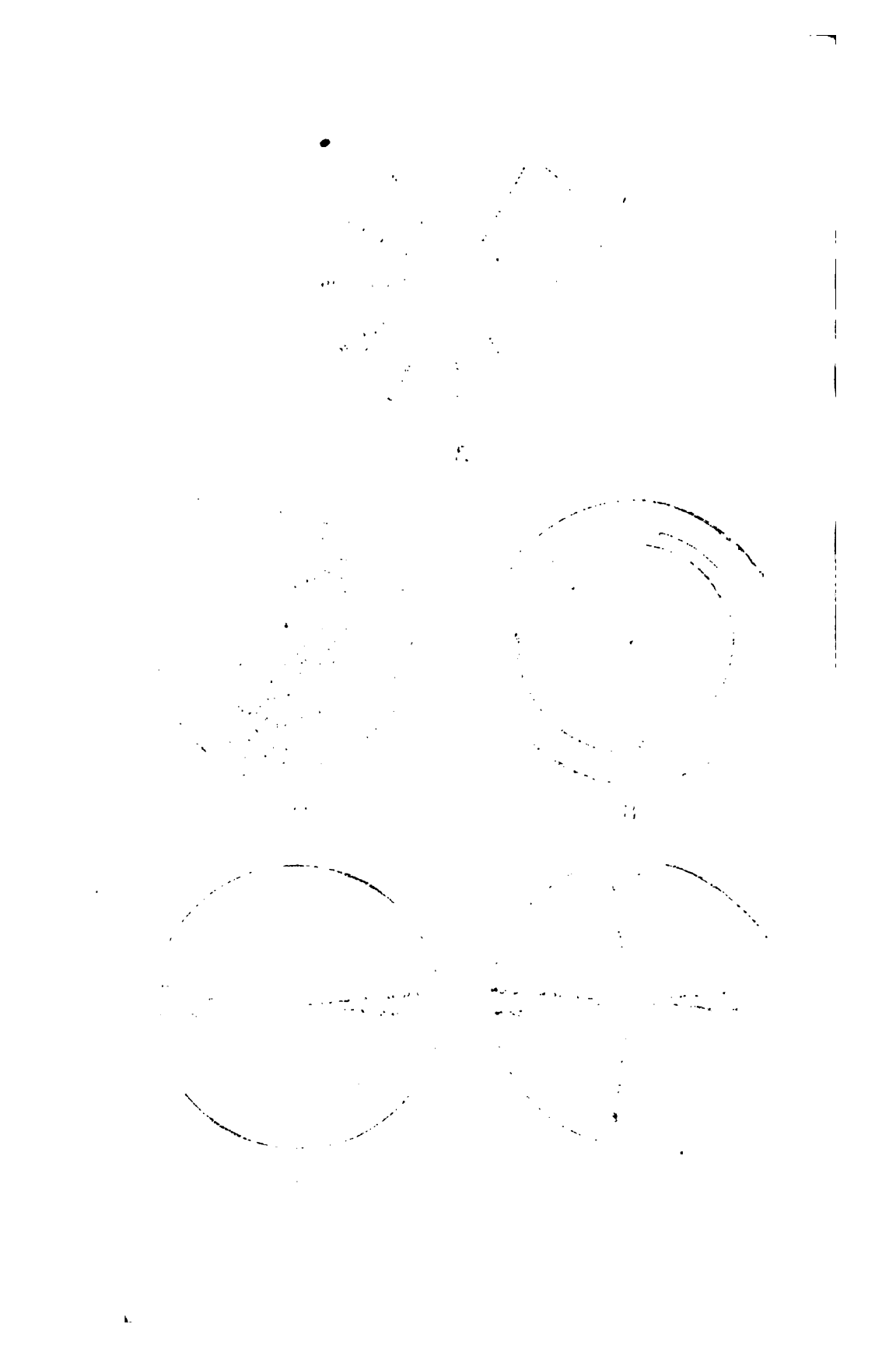

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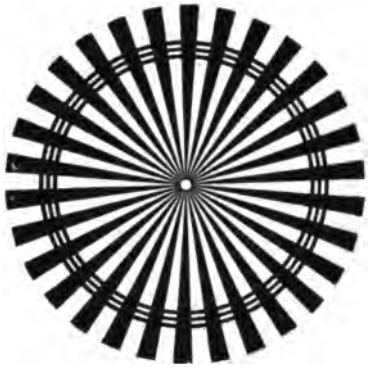

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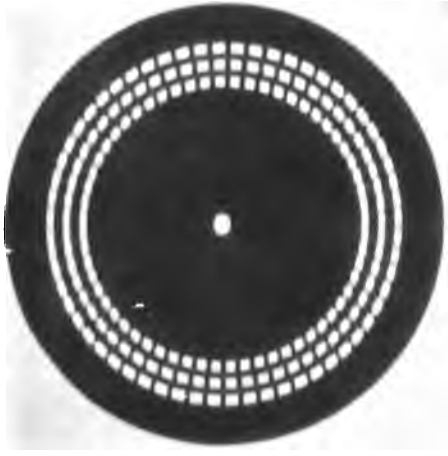
XX

Printed from a negative taken from Fig. X, with a diaphragm in the lens of the camera, and a cylindrical lens added. The effect is approximately that presented by As=1-12, with a moderately contracted pupil.



YY

From a negative taken from Fig. Y, without diaphragm, and with a cylindrical lens of half the power of that used in the case of Fig. XX. The effect is approximately that produced by As=1-24, with a moderately dilated pupil.

Heliograph of Robert Benecke, St. Louis, Mo.

A NEW MODIFCATION OF THE OPHTHALMOSCOPE.

By EDWARD G. LORING, M.D., New York.

OF the making of ophthalmoscopes there is no end, and even the most enthusiastic specialists are heartily tired of the whole matter. The writer would not therefore have taken the liberty of calling the attention of the Society to still another, if, after two years' experience, he had not felt convinced that the one now proposed possessed some merits worthy of a brief notice, and if he had not wished, in taking leave of a subject on which he had spent too much time already, to mention some points in the construction of an instrument which had been brought to his consideration in his various experiments and trials.

Whatever the rest of the world may think, I myself am grateful for even the modification of the last thread of the last screw. For, however trifling, or even finikin, the individual alteration may have been, my own among the number, I am convinced that the general result of so much competition in perfecting one of the most beautiful instruments known in medicine, has been the means of changing the method of examination from the almost exclusive use of the inverted image, to that of the comprehensive method of the upright image.

The first essential point is that the glasses should have a diameter of not less than six millimetres. To maintain this diameter, and to get at the same time a sufficient selection of glasses, we must either have an enormously large single disk, like Dr. Knapp's, of 56 mm. diameter, or a number of disks. The broadest diameter possible for the well-working of a disk is forty-four millimetres. The greatest number of perforations which such a disk as this can contain is sixteen, which, though sufficient for all ordinary work, is not enough for the higher degrees of ametropia.

The remedy for this state of affairs has hitherto been sought in two principal ways, either in separate or detachable disks, as in my earliest instrument and those directly copied from it, or in two superimposed disks, of which Landolt's ophthalmoscope may be considered a principal example.

Many years ago (1871) I constructed a combination ophthalmoscope with two superimposed disks, and discarded it on account of the objections which such a plan must invariably present; since,

when two entire disks are used, we must, in order to obtain any simple number, turn both disks every time to zero, without which the combination cannot be dissolved, for, as soon as one glass is revolved away from its position, another falls into its place. Nor can we turn at a moment's notice from plus to minus, and back again from minus to plus. Moreover, the necessity of progressing in a regular series of half-dioptrics to get small intervals in the weaker numbers, becomes useless and wearisome among the higher ones, and necessitates a great amount of turning. To all of which is added, moreover, the difficulty of notation, and the fact of this being recorded on both

FIG. 1.

sides of the instrument. The result of all this is a hopeless confusion as in Landolt's and similar instruments, which is as wearisome to the observer as to the patient. To obviate these objections as far as can be, the following arrangement, which differs from that other ophthalmoscopes hitherto proposed, in many important particulars, has been adopted:

This consists of a single disk and a segment of a disk, as shown in the drawing, Fig. 1.

In the present case a quadrant of a circle is used; this might, however, be made larger or smaller, if required.

The single disk contains sixteen glasses on the metric system, the plus being numbered in *white*, and the minus in *red*.* The first row of numbers, or that just beneath the glass, shows the *real* value of the glass; the second, or inner row, shows the result of the combinations when the quadrant is in position. The quadrant rotates immediately over the disk and around the same centre, and contains four glasses — .5 — 16. and + .5 + 16.

When not in use the quadrant is beneath its cover. The instrument then represents a simple ophthalmoscope with sixteen perforations, the series running with an interval of 1.D, and extending from 1 to 7. plus, and from 1. to 8 minus.

This is ample for all ordinary work, as the interval of 1.D is as close as even an expert usually desires, and can, with a little experience, be used for even very minute discrepancies. For if in a given case the fundus is seen distinctly with 1.D and a little to spare, while 2.D blurs the picture, we know at once that the refraction must be between the two, or 1.5 D. If, however, for any reason we wish to prove this conclusion, we can bring up 0.5 D. From this glass we get successive half-dioptrics from 1 to 8. plus, and from 1 to 9. minus. In this way we have, so to speak, a fine and coarse adjustment, as in the microscope.

If the higher numbers are desired, these are obtained by combination with those of the quadrant. These progress regularly up to 16D, every dioptric being marked upon the disk; above this, up to + 23D and — 24D, we have to simply add the glass which comes beneath the 16D, turning always in the same direction.

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* Owing to the small body of ink which the types are capable of holding, the contrast between the red figures and the black background in the drawing is not nearly so marked as in the real instrument. In this latter, the bright scarlet figures produced by actual pigment, are even more vivid and brilliant than the white, especially under gas-light.

Beginning with 0, and revolving always from left to right, we obtain :	PLUS	Beginning with 0, and revolving always from *right* to *left*, we obtain.	MINUS
	0		1
	1		2
	2		3
	3		4
	4		5
	5		6
	6		7
	7 Bring up + 16		8 Bring up − 16
+ 16 − 8 =	8	− 16 + 7 =	9
" − 7 =	9	" + 6 =	10
" − 6 =	10	" + 5 =	11
" − 5 =	11	" + 4 =	12
" − 4 =	12	" + 3 =	13
" − 3 =	13	" + 2 =	14
" − 2 =	14	" + 1 =	15
" − 1 =	15	" + 0 =	16
" 0 =	16	" − 1 =	17
" + 1 =	17	" − 2 =	18
" + 2 =	18	" − 3 =	19
" + 3 =	19	" − 4 =	20
" + 4 =	20	" − 5 =	21
" + 5 =	21	" − 6 =	22
" + 6 =	22	" − 7 =	23
" + 7 =	23	" − 8 =	24

Thus, with the superposition of a *single* glass (+ 16 or − 16), and with an uninterrupted rotation, a series is obtained of successive dioptrics from 1 to 23 plus, and from 1 to 24 minus.

With the use of the 0.5 we can obtain in addition the following series with an interval of half a dioptric :

+ 0.	− 0.5
+ 0.5	− 1.
+ 1.	− 1.5
+ 1.5	− 2.
+ 2.	− 2.5
+ 2.5	− 3.
+ 3.	− 3.5
+ 3.5	− 4.
+ 4.	− 4.5

+ 4.5	− 5.
+ 5.	− 5.5
+ 5.5	− 6.
+ 6.	− 6.5
+ 6.5	− 7.
+ 7.	− 7.5
+ 7.5	− 8.
+ 8.	− 8.5
	− 9.

Making a total series of sixty-five glasses. Should the combination at any moment not be wanted, a trifling displacement of the quadrant to either side of the mirror-hole at once dissolves it, and the instrument becomes a single-disk ophthalmoscope.

In this manner an enormous quantity of glasses can be placed at our service, in case of need, without our being compelled to use them on all occasions, or to turn through them in our search for a particular glass. The fear that by a combination of two glasses the quantity of the light would be diminished has not been realized, and I have frequently got a good view of the fundus with − 24 D ($\frac{1}{1.5}$ old style), which is the severest test which can be applied. Indeed, I have never used an instrument in which I obtained so much light for the upright image. This may be due in part to the extreme thinness of the glasses, the strongest being less than half a millimetre thick.

The mirror shown in the drawing is the "tilting" mirror. If preferred, however, the "three-quarter" mirror or the common circular mirror can be employed.

For a description of these mirrors, the reader is referred to the author's paper in the Report of the Fifth International Ophthalmological Congress, 1876, p. 85. In regard to the advantage of a mirror set at an angle for the use of the upright image, there can be no possible doubt in the mind of any one who has once seen the difference, in the ease of the illumination and the clearness and brilliancy of the picture. By their use, a large quantity of light is saved, since the correcting glass, instead of being at a considerable angle with the axis of vision, and therefore in a position favorable to a largely increased loss of light through reflection from the surface of the glass, is nearly at right angles to it, by which all the light possible is saved. This mirror gives also ample light for the inverted image, and I now use it entirely for all methods of examination.

The instrument is made with or without a cover for the posterior surface of the glasses. As a matter of fact, the glasses can be kept

cleaner when the posterior surface is not covered than when it is, provided that, as in the present case, they are protected by a rim.

Fig. 2 represents the same instrument with a different method of notation, consisting of two concentric rows of figures, the outer row being the plus and the inner the minus.

FIG. 2.

This is certainly the more elegant form of the two, the only possible objection to it being that the *real* value of the glass is not always immediately below the glass itself, its place being sometimes occupied by the equivalent of the combination. No confusion can, however, occur, as the plus and minus numbers have distinctive colors, and progress in different directions—the red from right to left, and the white left to right.

In closing, I cannot forbear from calling attention to the exquisite delicacy, yet strength, of the work, which far surpasses anything I had supposed possible. The instrument is to be had of its maker, W. H. Hunter, 1,132 Broadway. Price, $35.

THE ÆTIOLOGY OF RETINITIS PIGMENTOSA, WITH CASES. By Dr. David Webster, New York.

Mr. Jonathan Hutchinson, in the *Ophthalmic Hospital Reports*, Vol. VII., page 435, says: "An ophthalmic surgeon, who may chance upon a good example of this rare malady, and may not feel inclined to trouble himself about it farther than the limits of his own specialty, is bound in the interests of general medicine to hand it over for investigation to some naturalist of wider sympathies."

In regard to the ætiology, he says: "There cannot be the slightest doubt that it is remarkably hereditary," and that "cases which favor the belief that consanguineous marriages may produce a tendency to it are of special value." He further states that "inherited syphilis may produce changes exceedingly like those of retinitis pigmentosa, but to be distinguished from the true disease on careful examination."

Stellwag tells us that "in a series of cases the disease has proved to be hereditary," and that "statistics show that it occurs much more frequently in children whose parents were blood-relations, than otherwise."

Schweigger says: "Heredity is an important element in the ætiology of the disease," and, without stating the results of his own observations, tells us that "more comprehensive statistics with reference to the matter of consanguinity are desirable."

Carter has never met with a case of retinitis pigmentosa in which any relationship between the parents existed, but generally finds more than one in the same family similarly affected. He has never been able to connect the disease with syphilis, either inherited or acquired.

Macnamara informs us that consanguinity of parentage cannot be the cause of the disease among the natives of India, as they are most scrupulous in observing the restrictions they place upon the intermarriage of relations, and yet he has seen some twelve or fifteen instances of it among his native patients within a period of one year. He says the disease is hereditary, and occurs frequently in several members of the same family; he is also disposed to look upon it, in some cases, as the result of inherited syphilis.

Wells says the disease is often hereditary, but seems to found his opinions entirely upon the observations of others.

Liebreich was the first who called attention to consanguinity of parentage as a cause of retinitis pigmentosa, and we do not wonder that he believed he had made a valuable discovery when we are told that in fourteen out of thirty-five cases he was enabled to prove a descent from blood-relations.

Mooren noted consanguinity of parentage in nine out of thirty-four cases.

Leber, in "*Handbuch der gesammten Augenheilkunde*," Vol. II., page 653, reports sixty-six cases of retinitis pigmentosa observed by himself. Forty-four were of the usual kind, while twenty-two were complicated with congenital atrophy of the retina. He found consanguinity of parentage in eighteen cases, or 27.3 per cent.; the disease affecting other brothers or sisters in fourteen cases, or 21.2 per cent.; heredity in one case, or 1.5 per cent.; hereditary syphilis in five cases, or 7.6 per cent.; and in twenty-eight cases, or 42.4 per cent., no cause could be ascertained.

We should infer from the observations of Liebreich, Mooren, and Leber, that consanguinity of parentage was one of the most frequent causes of the disease, and yet many other observers have failed to find it in any case.

In the report of the Wiesbaden Eye Infirmary for 1861–2, twelve cases of retinitis pigmentosa are given, and in not one was any consanguinity of parentage traceable.

Lawrence and Moon report four cases in the *Ophthalmic Review* for 1866—three boys and a girl in the same family. There was no consanguinity of parentage or traceable syphilis in the family.

Mr. Hutchinson reports four cases, none of whom showed consanguinity of parentage. In one case there was heredity, two of the patients being father and daughter.

Harlan, of Philadelphia, has reported a case, a girl of eighteen, without consanguinity of parentage, heredity, or inherited syphilis.

My friend, Dr. W. Cheatham, of Louisville, Kentucky, has been kind enough to furnish me with the following most extraordinary history of a family afflicted with this disease. He says: "I was called, lately, to see a case of cataract that had been operated on seven weeks previously. On examination I found dark-colored cataract of the right eye. The pupil of the left eye was closed, and the eyeball was very tender to the touch, and quite painful. Both visual fields, as tested by a lighted candle in a dark room, were contracted to almost nothing.

"On getting the history of the case, that of the whole family

was given, extending back for a period of over two hundred years. Thinking, from the history of the patient, that the eye trouble from which the family suffered was retinitis pigmentosa, I requested that some of them should submit to an ophthalmoscopic examination. Two gentlemen of the family called at my office the next day. The examination revealed well-marked retinitis pigmentosa in both cases. They were kind enough to give me a full history of their family, one branch of which can be traced directly to Pocahontas. The disease had been in the family for over two hundred years. A peculiar feature of it, as it existed in them, was that it attacked about one-half of them only. It appeared to select about every other one. For instance, one member of the family had nine children. The first one born had the disease, the second one it missed, the third had it, and so on through the whole of the nine children.

"Another interesting feature is, as soon as twilight sets in, the blindness usual in such cases begins, yet, by bright moonlight, some of them are able to read the finest print; but the instant they get into the slightest shade the hemeralopia again appears. Again, there has been but one intermarriage in the family, and the children of this couple are the only ones all of whom are entirely exempt from the disease, all the others, as I said before, having about every other one attacked by it!"

Dr. Cheatham informs me that the family whose history is related above is "one of the most numerous in the South." It certainly demonstrates, beyond all reasonable doubt, the hereditary nature of retinitis pigmentosa.

I have succeeded in collecting from the case-books of Dr. C. R. Agnew, with his kind permission, nineteen cases in which the records were tolerably complete, and, adding to these three cases which I saw in Massachusetts, I am enabled to present to the Society the histories of twenty-two cases, nearly all of which I examined personally.

Inspection of these cases will show that consanguinity of parentage was traceable in only three out of the twenty-two cases, or in 13.6 per cent. Possibly this does not very much exceed the general percentage of intermarriages of blood-relations in the United States, and when we observe that in one of the three cases heredity undoubtedly existed, the mother having always seen much worse than other people after dark and in darkened rooms, and that in another of them a suspicion of heredity exists, the mother having long been subject to weak eyes, and that in the third case the patient was a

deaf-mute, we are inclined to the opinion that consanguinity of parentage, if at all, is a comparatively weak element in the causation.

Heredity was present in seven cases, or in 31.8 per cent., and there was good reason for suspecting heredity in several other cases, but it could not be proved.

Three of the patients were members of the same family, and three others had brothers, sisters, or cousins with the same disease.

One patient had a daughter with an appearance and history which would lead one to suspect inherited syphilis.

One patient attributed the disease to his having been struck by lightning at the age of eight.

Two of the patients were deaf-mutes.

One or two of the patients had relatives with various diseases of the nervous system.

In six cases no cause was ascertained, there being no heredity, no consanguinity of parentage, and no history of nervous diseases in their families.

I append, in full, the notes of the twenty-two cases, as some of them contain points of interest aside from the causation.

CASE I.—Ella P., 16. First noticed night-blindness five or six years ago. She sees well in the day-time, and in the night can see to read and write by gaslight, but cannot see well enough to get about alone. Vision = $\frac{20}{200}$ each eye; no improvement with glasses.

Ophthalmoscopic Examination.—Each eye H. $\frac{1}{14}$. Retinitis pigmentosa and partial atrophy of optic nerve, both eyes; slight posterior polar cataract right eye.

Her father and mother are first cousins. Her mother has always had weak eyes.

CASE II.—S. Q., 16, deaf-mute. Has vision = $\frac{20}{70}$, each eye, and no improvement with glasses. His visual fields are greatly contracted.

The ophthalmoscope shows H. $\frac{1}{10}$ each; retinitis pigmentosa with atrophy of optic nerves and retinæ.

His father and mother are cousins.

CASE III.—Oct., 1868. Frederic S., 20. Since childhood, or as far back as he can remember, he has not been able to see well in the dark. He has to be led about after dark. He can see by gaslight as well as by day. He has never suffered from pain or other trouble in the eyes. His parents were first cousins, once removed.

His mother has always seen badly at night, or in a darkened room, and has remarked especial difficulty in getting up and down the stairs in hall-ways that were not well lighted. She has, however, no pigment deposits in her retinæ, and seems to be one of those cases of "retinitis pigmentosa without the pigment," that have lately been described. The patient's grandmother is over 90, and reads the finest print without glasses, and yet is said not to be near-sighted.

Ophthalmoscopic Examination.—Typical retinitis pigmentosa; the retina looks hazy, especially near the optic nerve; the retinal vessels are diminished. Vision = $\frac{20}{20}$ (—) with — $\frac{1}{48}$° each eye; acc. = $\frac{1}{5}$; no insufficiency of ocular muscles.

Feb. 1, 1878.—V. = $\frac{20}{30}$ each, and not improved by glasses. Each visual field reduced to an area of about four inches in diameter at a distance of one foot.

The patient was placed upon daily hypodermic injections of a solution of nitrate of strychnia, commencing with gr. $\frac{1}{60}$ and gradually increasing the dose until, on Feb. 11th, the physiological effects of the drug were produced. Neither central vision nor the visual field was appreciably affected by it, and the patient was dismissed with an unfavorable prognosis.

CASE IV.—April 30, 1878. Mrs. T. H. M., 42. Has always had poor vision with hemeralopia, and lately it has been growing worse. R.V. = $\frac{8}{100}$; no improvement with glasses. L.V. = $\frac{20}{100}$; V. = $\frac{11}{16}$ with + $\frac{1}{16}$.

The limitation of the visual fields is not concentric, but very irregular, and there are numerous scotomata.

Ophthalmoscopic Examination.—Both eyes H. $\frac{1}{16}$; the right retina is loaded with pigment deposits of all sorts, sizes, and shapes; the left shows the same appearances, but in less degree. There is partial atrophy of both optic nerves.

The patient's father and mother were both of the same name, but not related to each other. She has three sisters and a brother living. The brother has impaired vision, with eyes which the patient states "are just like hers, only not so bad." The three sisters see well. Her father's brother married his first cousin and had nine children. Three of these became blind and afterwards idiotic; a fourth had good sight, but was attacked with scrivener's palsy, and some years ater died of a disease of the nervous system.

Mrs. M. was placed upon injections of nitrate of strychnia, commencing with gr. $\frac{1}{24}$.

May 1.—Has had a great deal of pain in left eye since her visit to

us yesterday. There is some deep injection of the eyeball. Ordered to bathe the eye frequently, and injected nitrate of strychnia, gr. $\frac{1}{30}$.

May 2.—The pupil of the left eye is irregular, showing adhesions, and there is a moderate amount of pericorneal injection, showing the existence of iritis. A solution of sulphate of atropia (gr. iv. ad ℥ j.) was dropped into the eye four times while the patient remained in the office about an hour, but failed to dilate the pupil regularly. Injected strychnia, gr. $\frac{1}{17}$.

May 3.—Patient states that after she left the office yesterday her mouth and throat became dry, her head felt full and heavy, and she "went sound asleep" in the horse-car going home, and fell asleep in a chair after she got home. The pupil is widely and evenly dilated, and the redness has disappeared. Injected strychnia, gr. $\frac{1}{15}$.

May 15.—The patient has had a daily injection of strychnia. One-ninth of a grain was injected to-day, and produced some stiffness of the limbs. Her vision remains unchanged.

CASE V.—Sept. 12, 1873.—Mrs. E. L. J., æt. 53, states that seven or eight years ago a blur began in her right eye after a great shock to the nervous system in the death of a daughter. During the four weeks previously she had been deprived of sleep and constantly in the sick-room. Had a second daughter ill who died last summer. Has wept much and evidently been greatly shocked in her nervous system. Reads J. No. 15 very slowly, picking out letters at 11″ with glasses. Ophthalmoscopic examination shows retinitis pigmentosa. Injected strychnia, gr. $\frac{1}{24}$, and a few minutes later patient reads J. No. 12.

Sept. 15.—A few minutes after injecting strychnia, gr. $\frac{1}{24}$, patient reads J. No. 5.

Her husband writes, under date of May 10, 1878: "My wife died two years ago. Her sight continued gradually to fail, until it became difficult for her to get about without assistance. Her father and mother were not related to each other. Her older brother, who died some years ago, was troubled with imperfect vision, more especially I think at night. I never knew any other member of her family who was affected in that way."

CASE VI.—Jan. 13, 1874.—Mr. C. Z. L., æt. 25, law student, always had an imperfection of vision, near-sightedness, and difficulty of seeing in the night. Otherwise, eyes seemed quite strong. In Aug., 1871, first noticed clouds floating through visual field; moving his eyes would set them in motion, and when the eyes were fixed they would settle down and disappear. Soon after waves of light

commenced to sweep across his eyes, and have continued to do so up to the present. For more than a year he has had a constant appearance as of the flickering of candles. Since last winter he has had, once or twice a week, appearances like a ball of fire passing across the field of vision. Occasionally a small black spot surrounded by a ring of light is seen for a few moments.

No consanguinity of parentage. Mother died of consumption; father of dropsy. Has two brothers and two sisters. One brother and one sister have imperfect sight.

R.V. = $\frac{2}{8}\frac{0}{0}$; L.V. = $\frac{2}{8}\frac{0}{0}$; no improvement with glasses. Visual fields greatly contracted. Reads J. No. 1 at 9″ with each eye.

Ophthalmoscopic Examination.—Fundus beautifully besprinkled with the characteristic changes. Pigment patches, increasing in size and frequency in the periphery, some running over the vessels. There is a vessel in fundus of right eye, above the optic disc, which is a streak of pigment as far as it can be traced. There is thinning of the choroid in places, and the nerves have a somewhat atrophied look.

Injected strych. nitrat., gr. $\frac{1}{2}\frac{1}{4}$. Before the injection he read J. D. V. and I. in $\frac{2}{8}\frac{0}{0}$, but could not read the four intervening letters with each eye; five minutes after, he read all the letters in $\frac{2}{6}\frac{0}{0}$, and T. P. and Z. in $\frac{2}{4}\frac{0}{0}$ with each eye under the same conditions. The injection made him dizzy.

Jan. 14.—Injected strych. nitrat., gr. $\frac{1}{1}\frac{1}{2}$, but no appreciable improvement of vision followed.

CASE VII.—A. C., æt. 44, manufacturer. Was always subject to night-blindness, but only a few years since began to notice impairment of vision in the day-time. A few years ago he got hot lead into his right eye, and has not been able to read with it since. His mother is subject to night-blindness. His maternal aunt has two children who are subject to night-blindness. His maternal uncle has one child with night-blindness. The patient has three sisters, all subject to night-blindness, thus making eight in the same family, all victims of this disease. R.V. = $\frac{2}{2}\frac{0}{0}\frac{0}{0}$; L.V. = $\frac{2}{3}\frac{0}{0}$; no improvement with glasses. Visual fields about circular, and very small.

Ophthalmoscopic Examination.—Retinitis pigmentosa very marked in both eyes; right eye has also posterior polar cataract and floating odies in the vitreous.

No consanguinity of parentage.

CASE VIII.—Miss M. C., æt. 16. Has for five years been the subject of night-blindness and gradually deteriorating vision.

R.V. = $\frac{4}{200}$; L.V. = $\frac{4}{70}$; no improvement with glasses. Fields extremely small. No heredity or consanguinity of parentage traceable.

Ophthalmoscopic Examination.—Periphery of each retina sprinkled with the deposits characteristic of retinitis pigmentosa. Optic disks and adjacent choroid show evidences of atrophy.

At the age of eight this patient was struck by lightning, and rendered insensible for a few moments.

CASE IX.—George L., æt. 14, deaf-mute, and always subject to night-blindness. V. = $\frac{20}{70}$ each; no improvement with glasses; visual fields concentrically limited.

Ophthalmoscopic Examination.—Retinitis pigmentosa, with partial atrophy of optic nerves. No consanguinity of parentage or heredity traceable.

CASE X.—Joseph B., æt. 60, laborer. States that he saw as well as he *ever* saw, but not as well as other people, up to two years ago. He has always seen much worse at night and on cloudy days. Blindness came on very gradually. R.V. = $\frac{4}{\text{fingers}}$; L.V. = $\frac{\frac{1}{2}}{\text{fingers}}$; no improvement with glasses. Visual fields reduced to one inch each in diameter, at one foot. No heredity or consanguinity of parentage.

Ophthalmoscopic Examination.—Retinitis pigmentosa with atrophy of optic nerve, and polar cataract in both eyes.

CASE XI.—Mrs. W. P. E. M., æt. 40. Has R.V. = $\frac{20}{70}$ with $-\frac{1}{4\frac{1}{2}}$; L.V. = $\frac{1}{200}$; no improvement with glasses.

Ophthalmoscopic Examination.—Retinitis pigmentosa of both eyes, with atrophy of left optic nerve. No consanguinity of parentage.

The patient brings her daughter for examination. She is aged 17, and has an eroded, moth-eaten look at the angles of her mouth, and a constriction around the middle of her forehead. She had keratitis following scarlatina at the age of ten. When 11 months old, she had paralysis of her left side, and she still walks heavily on that side. She now has opacities of both corneæ, staphyloma posticum, and disseminated choroidal atrophy of both eyes, and floating bodies in left vitreous.

CASE XII.—Ernest G., æt. 24, theological student. States that his sight became weak at about 9 years of age. His father and mother are not related, and he knows of no heredity.

R.V. = cannot count fingers correctly, but has a visual field one inch in diameter at one foot.

L.V. = $\frac{4}{200}$; visual field two inches in diameter at one foot. Both visual fields very nearly circular.

Ophthalmoscopic Examination.—Retinitis pigmentosa, with posterior polar cataract, and partial atrophy of optic nerve, both eyes.

CASE XIII.—Mrs. B. F. F., æt. 34. R.V. = $\frac{20}{40}$; L.V. = $\frac{20}{100}$; no improvement with glasses. Visual fields concentrically contracted.

Ophthalmoscopic Examination.—Retinitis pigmentosa of both eyes.

Father and mother were not related, and had only two children, both girls. Patient's sister is very short-sighted. She has one paternal uncle who is very short-sighted, but no other relative with defective vision in a very large circle of connections. Her mother died suddenly, without previous illness, at the age of 47.

CASE XIV.—Mrs. J. H. M., æt. 50. Has been near-sighted from childhood; has had asthenopia for two years, and is growing worse. She has slight conjunctivitis.

R.V. = $\frac{5}{100}$; V. = $\frac{20}{40}$ with $-\frac{1}{8}$.

L.V. = $\frac{20}{60}$; V. = $\frac{20}{30}$ with $-\frac{1}{42}$.

Both visual fields are limited.

Ophthalmoscopic Examination. — Retinitis pigmentosa, the pigment deposits being principally in the temporal part of the periphery of each fundus.

No consanguinity of parentage or known heredity.

CASE XV.—O. L. W., æt. 58, machinist. Sight began to fail twenty years ago, and he has not been able to read for ten years. He never has pain in his eyes, except when out in the wind. He sees objects, but fails to count fingers correctly with either eye.

Ophthalmoscopic Examination.—Retinitis pigmentosa, with atrophy of optic nerve, both eyes.

No consanguinity of parentage, syphilis, or known heredity.

CASE XVI.—Miss M. C., æt. 15. Has always had rather poor vision, and never could see well in the night, or in a darkened room. Her sight has failed lately.

R.V. = $\frac{20}{50}$; L. V. = $\frac{20}{40}$; no improvement with glasses. Both visual fields greatly concentrically contracted.

Ophthalmoscopic Examination.—Retinitis pigmentosa, with marked absence of pigment in its normal position in the retina.

No heredity or consanguinity of parentage traceable.

CASE XVII.—M. F., æt. 30, carpenter. Never noticed any trou-
e with eyes till five or six years ago, and then first began to have
fficulty in getting about at night. It increased up to about a year

ago, since which it has been at a standstill. Things began to blur about a year ago.

R.V. = $\frac{20}{20}$; Hm. $\frac{1}{36}$. L.V. = $\frac{20}{20}$ (−) E.

Visual field, right, most of upper half gone; left, only infero-temporal quadrant remains.

Ophthalmoscopic Examination.—Retinitis pigmentosa well-marked in both eyes.

No consanguinity of parentage, and the patient never heard of any cases of poor eyesight in the family.

CASE XVIII.—J. R. P., æt. 44, farmer. Lost right eye when a boy; when eight years old happened to close left eye, and found himself in darkness. Sight in left eye began to fail noticeably fifteen months ago, and he has not been able to read for five months. There is smarting and stinging of the left eye.

R.V. = counts fingers in extreme temporal portion of field. L.V. = $\frac{20}{60}$; no improvement with glasses. Visual field limited concentrically.

Ophthalmoscopic Examination.—Retinitis pigmentosa, with choroiditis of both eyes.

He has been treated with mercurials, leeches to temples, and strychnine injections, without benefit.

No consanguinity of parentage. Maternal grandfather had seven children. The families of five have had more or less trouble with their sight. Of his father's eight children, patient's eldest sister and himself are the only ones affected with retinitis pigmentosa.

CASE XIX.—Mrs. S. W., æt. 32. Has had weak eyes for over a year, and has not been able to use them to any extent in reading or sewing.

V. = $\frac{20}{20}$ each; E.; no insufficiency. Ophthalmoscope shows delicate changes about the macula, and an extensive plaque of the changes characteristic of retinitis pigmentosa in the periphery infero-nasally from disk. No limitation of fields. No consanguinity. Mother has atrophy of optic nerves, and a sister is near-sighted.

CASES XX., XXI., and XXII.—In 1876 I became acquainted with a family in Massachusetts by the name of B——, three members of which were afflicted with retinitis pigmentosa, and possibly a fourth, whose eyes I had no opportunity of examining.

(20). The eldest brother, now 49 years old, having always had poor sight, became totally blind at the age of 25. Ophthalmoscopic examination showed the characteristic pigmentary deposits scattered

over the whole fundus, atrophy of the optic nerve, and posterior polar cataract in both eyes.

(21). A younger brother, now 30 years old, could see sufficiently well to do a farmer's work up to the age of 15. He can still see to find his way about. He has retinitis pigmentosa, with atrophy of optic nerve, and posterior polar cataract, of both eyes, the same as his brother. Neither of the brothers is married.

(22). The third is a married sister, 46 years of age. Although the subject of marked retinitis pigmentosa in both eyes, she still retains sufficient sight to do her own housework. She has neither polar cataract nor marked atrophy of her optic nerves. She has had three children. The first died at 16 weeks, having always been apparently healthy; "took cold," and was given an overdose of medicine by mistake. The second was apparently healthy, but "took cold," and died suddenly at 11 weeks. The third, always sickly and "cankered," died at 6 weeks.

Another brother, now 33, has used glasses some ten years, only for reading. He keeps a baker's shop, and his eyes do not trouble him when about his business. The oldest sister, over 50, and the brother and sister next younger than the married sister whose case is given, have no trouble with their eyes. The three that are said to have good eyes are the first, fourth, and fifth. The four that have poor eyes are the second, third, sixth, and seventh.

The parents of this afflicted family were *not* blood-relations.

The father's aunt, blind from youth, died at 60.

The father's father had inflammation in his eyes "from a cold," and was blind for three or four years before his death, at the age of 76.

ENUCLEATION OF AN EYEBALL, FOLLOWED BY IMMEDIATE AND MARKED REDUCTION OF THE AMOUNT OF URINE PASSED, IN A CASE OF DIABETES INSIPIDUS. By Dr. Geo. T. Stevens, Albany, N. Y.

On the 17th of September, 1877, Mr. S. brought to me his daughter, whose case had been referred to me by Dr. Smythe, of Minaville, N. Y.

A., the patient, was a bright and interesting girl, thirteen years of age, who had, five years previous to the visit to me, thrust the sharp point of a scissors into the right eyeball, penetrating the sclera and the ciliary body.

Intense inflammation followed the injury, but under the care of the family physician she at length recovered from the inflammation, preserving mainly the form of the globe, but with entire loss of sight of the injured eye.

There was, at the time of her visit to me, opacity of the lens, and the pupillary border of the iris was adherent to the capsule; a prominent scar at the outer border of the cornea marked the location of the injury.

The eyeball was somewhat enlarged, and tender upon pressure, especially over the ciliary region.

It was the condition of the uninjured eye which had led the father to consult me.

This eye had for several weeks been painful and extremely sensitive to light, conditions causing much solicitude on the part of her friends. I found the eye quite sensitive to pressure, with well-marked pericorneal injection, and learned that she was annoyed by subjective sensations of light.

Ophthalmoscopic examination revealed nothing more than hyperæmia of the deep structures.

I had no hesitation in informing the father that the child was suffering from a sympathetic irritation of the eye, and that it might at any time pass to sympathetic inflammation which would be likely to prove fatal to the sight of the eye. I advised that no time be lost in removing the injured organ, as it was the only safe course.

My advice was accepted, and on the following day the girl presented herself accompanied by an elder sister, when, under the influence of anæsthetics, the injured eye was removed.

The case progressed favorably so far as the wound of the operation was concerned, and after a few days she was allowed to return home, the pain and irrritability of the remaining eye having been greatly diminished, although not altogether relieved, as there remained considerable supraorbital neuralgia of the side from which the eye had been removed, and a less degree on the other. On this account she was advised to return after a few days.

It was nearly a month after the operation when the patient did return, this time accompanied by her mother; and it was at this interview that I first learned the facts which gave to the case unusual interest.

From the mother I learned that the girl had always, until the time of the injury to the eye, been a vigorous and healthy child, never having suffered from any form of nervous troubles. After the injury, however, and up to the time of the operation, she had suffered many violent paroxysms of pain in the stomach, each of which had prostrated her with severe illness for several days.

These attacks the mother called inflammation of the stomach, but from her description I regarded them as attacks of violent neuralgia of the stomach. She had also suffered greatly from headaches —so much so as seriously to interfere with her attendance at school, from which she had been detained the greater part of the time since the injury.

But the fact of greatest interest was, that during four years past she had suffered from a severe form of *diabetes insipidus*, which had run a very uniform course during all those years.

She had habitually voided the urine very frequently during the day, and it had been the custom of the mother or the elder sister to rouse her from her bed several times every night for this purpose, and it had been usual for her to fill an ordinary chamber-vessel nightly. Notwithstanding all these precautions and the great discharge into the vessel, no night passed when the bed was not repeatedly wet, the fluid sometimes penetrating the mattresses and flooding the floor beneath.

On the night after the removal of the eyeball, the sister, not wishing to disturb the patient, made the best preparations she could for the protection of the bed, and carefully watched her during the night. To her surprise, no urine was passed until the patient rose in the

morning, and, to the greater surprise of both sister and mother, there had been no involuntary discharge of urine from the time of the operation to the time of the mother's visit to me, a month afterward.

The amount of urine passed during the day was greatly reduced in quantity, and although she was still under the necessity of leaving her bed once, or even at times twice during a night, usually, yet many nights passed when she was not subjected even to this inconvenience.

For several months I watched the case with great interest, and, with the exception of a slight relapse on one or two occasions when she had been exposed to fatigue and cold in coming to Albany and returning, I was assured that there had been no return of the involuntary discharges. Not only this, but the headaches were much relieved and the pains in the stomach had entirely disappeared.

As there still remained some supraorbital pain, especially over the orbit from which the eye had been removed, and as there was still an abnormal secretion of urine, I had the patient return to Albany for a week or two, during which Faradism was practised, the current being passed from the supraorbital region to the temple. Under this treatment she was so nearly well of both troubles that I allowed her to return home.*

There the supraorbital pain and the dysuria returned in about the same degree as before the treatment with the battery. As her friends wished her to remain at home, various medicines were prescribed, with a view of arresting the pain over the brows and of checking the renal secretion, but I am not aware that any medicine had the slightest effect upon either. About two months ago—or about eight months after the removal of the eye—the frontal pain was again almost as intense as before the operation, and involuntary discharges of urine returned, although in a degree scarcely to be compared to the original condition. I now insisted upon the parents procuring a battery, and administering the induced current as before. No sooner was this done than the two troublesome conditions yielded, although neither has ever been fully and completely subdued.

---

* As the existence of the abnormal secretion of urine was not suspected by me at the time of the removal of the eyeball, of course no examination of the character of the fluid, nor any measurement of the amount evacuated daily, was made.

That the amount was enormous seems beyond question, from the testimony of the patient and her friends. Specimens examined after the operation exhibited a specific gravity of about 1,010, a faintly acid reaction, and absence of sugar or albumen.

The painful spot is a surface nearly an inch square, over the inner angle of the eyebrow of the right side. A corresponding point, with pain of much less intensity, is over the other eyebrow. The first is always tender to the touch, and the other generally. There is no apparent thickening of the tissues at either of these points.

There seems unquestionably to be neuritis, which is relieved by Faradism, which does not yield to any medicine yet administered.

We have in this case the phenomenon of an obstinate and dangerous disease of distant organs, having for its exciting cause an injury to the ciliary body, almost entirely relieved by the removal of the eye, but continued in a modified degree by a neuritis of some of the branches of the ophthalmic nerve acting as a secondary centre of irritation ; the distant disease relenting when there is less manifestation of neuritis, and renewing its manifestations when the symptoms of neuritis are active.

Diabetes insipidus is generally recognized as a nervous disease, and if irritation from injury of the ciliary nerves is competent to produce so great disturbance of the functions of distant organs as appears in this case, it seems an entirely justifiable conclusion that irritation of these same nerves from any cause may be productive of neurotic disturbances of various forms, and without regard to distance or immediate nervous communication ; and it would also seem reasonable to suppose that we may expect to relieve these neuroses, when a relation between the two classes of conditions is found to exist, by such measures as would be calculated to relieve the ciliary irritation.

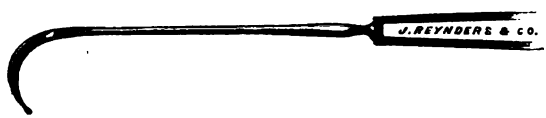
During the past four years I have, at various times, endeavored to call the attention of the medical profession to relations between difficulties and derangements attending the performance of the functions of the ciliary nerves and a great variety of nervous phenomena. In so doing I have hoped to convince the profession that these relations are of far greater frequency and consequence than have been heretofore conceded.

Whether the case above related has a legitimate bearing upon the principle which I have advanced, I submit to the profession.

Certainly, my own experience in a considerable number and variety of obstinate and obscure neuroses, which, after resisting all ordinary treatment, have easily and quickly yielded to measures directed to the relief or assistance of the ciliary nerves in the performance of their functions, has led me to the belief that this case has an important bearing upon that principle.

A CURVED KNIFE FOR CERTAIN FORMS OF STRICTURE OF THE INFERIOR LACHRYMAL CANALICULUS. By Dr. C. R. Agnew, New York.

All must have encountered cases of lachrymal obstruction in which the calibre of the inferior canaliculus is greatly reduced by a stricture just where the canal should pass by a free opening into the lachrymal sac. I have long observed that the common strabismus-hook would pass such a stricture when a probe or probed knife pressed onward in the plane of the canaliculus would be stopped entirely, or, if unduly pushed, perforate the floor of the canal, and make a false passage below the stricture, and between the sac wall and the maxillary bone. The curve in the strabismus hook seemed to make it comparatively easy to override the stricture and to pass the instrument forward into the dome of the lachrymal sac. Following out this line, it occurred to me to make an instrument shaped somewhat



like a strabismus-hook, only a little more curved, and upon a smaller arc, and to sharpen the inside of the curve, and to make the extremity probe-pointed, so that, having passed it into the sac, I might incise the upper wall of the canaliculus at the sac entrance, and so make way for subsequent instrumental manipulation. The instrument here delineated may also be made to cut the lower floor of the canaliculus near the sac by first introducing it into the sac with the convex edge downward, and then sweeping it around before withdrawing it, so as to make it cut downward.

The instrument may not be new; my colleagues may think it of no value. I have only to say that I have used it with benefit to patients when other means had failed.

Note.—The bulb on the free end of the knife should not be quite so large the cut shows.

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CONTENTS.

PAGE

MEMBERS OF THE SOCIETY 515

MINUTES OF THE FIFTEENTH ANNUAL MEETING 519

On the Operation of some Kinds of Complicated Cataract. By Dr. H. KNAPP, New York 527

Influence, on the Refraction, of Four Years of College Life. By Dr. HASKET DERBY, Boston, Mass 530

Dacryocystitis in Nursing Infants. By Dr. C. J. KIPP, Newark, N. J 537

Case of Sarcoma of the Conjunctiva, with woodcuts. By Dr. E. DYER, Pittsburg, Pa 538

Extirpation in Panophthalmitis. By Dr. G. C. HARLAN, Philadelphia, Pa .. 542

Prolapse of Retina, in Consequence of Hemorrhage following Iridectomy for Glaucoma. By Dr. D. WEBSTER, New York 544

Demonstration of Water-Color Drawings of some of the Rarer Forms of Diseases of the Eye, with woodcuts. By Dr. W. F. NORRIS, Philadelphia, Pa 547

Paresis of Inferior Oblique Muscle. By Dr. H. D. NOYES, New York 551

Tumor of the Optic Nerve, with woodcut. By Dr. H. KNAPP, New York .. 557

A Case of Sarcoma of the Choroid, Removed at an Early Stage. By Dr. H. KNAPP, New York 560

The Diffusion Circles of Ametropia. By Dr. A. G. HEYL, Philadelphia, Pa 561

Ischæmia of the Retinal Vessels of both Eyes, following Facial Erysipelas. By Dr. D. COGGIN, Salem, Mass 570

A Case of Apparent Atrophy of the Optic Nerve, in which Recovery of Eyesight followed the Use of Hypodermic Injections of Nitrate of Strychnia. By Dr. D. WEBSTER, New York 573

Plastic Operations at the Inner Canthus. Report of Three Cases. By Dr. H. D. NOYES, New York 575

PAGE

A Description of a Modification of Förster's Perimeter, with woodcut. By Dr. W. H. CARMALT, New Haven, Conn..... 584

Statistics of Extractions of Cataract by the Flap Operation and by v. Graefe's Method. By Dr. H. D. NOYES, New York..... 587

A Case of Intra-orbital Tumor of Rapid Growth, which resulted in Death. By Dr. J. F. NOYES, Detroit, Mich..... 594

Foreign Body in the Posterior Pole of Lens. By Dr. T. R. POOLEY, New York..... 595

Hyperostosis and Periostosis of the Bones of the Orbit. Illustrated by two cases. By Dr. C. S. BULL, New York..... 598

The Treatment of Strictures of the Nasal Duct by means of Large Probes. By Dr. S. THEOBALD, Baltimore, Md..... 602

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DR. E. REYNOLDS.....Boston, Mass.
DR. C. SCHWEIGGER.....Berlin, Prussia.

Total..... 5
Whole number.....78

MINUTES OF THE PROCEEDINGS.

FIFTEENTH ANNUAL MEETING.

NEWPORT, *July* 24, 1879.

THE Society held its Fifteenth Annual Meeting at the Aquidneck House, at 9.30 A.M. The President, DR. HENRY D. NOYES, in the chair.

In the absence of Dr. Richard H. Derby, the Secretary, Dr. David Webster was elected Secretary *pro tem.*

The minutes of the last session of the last meeting were read and approved.

The following gentlemen were appointed by the Chair a Committee on Membership and Nomination of Officers: Drs. H. W. Williams, J. Green, G. C. Harlan, J. S. Prout, and W. H. Carmalt.

The President appointed as a Committee on Bulletin, Drs. Hasket Derby, E. Dyer, and G. Strawbridge; and as Auditing Committee, Drs. F. B. Loring and H. G. Miller.

The Report of the Treasurer was read, and referred to the Auditing Committee. Having been reported as correct, it was accepted by the Society.

The resignation of Dr. Francis Delafield was presented, and accepted.

The following gentlemen were then proposed for membership by the Committee on Membership:

DR. SAMUEL D. RISLEY, of Philadelphia, proposed by Drs. Norris and Harlan.

DR. HENRY S. SCHELL, of Philadelphia, proposed by Drs. Norris and Harlan.

DR. OLOF PAGE, of San Francisco, proposed by Drs. Norris and Harlan.

DR. LEARTUS CONNOR, of Detroit, Mich., proposed by Drs. J. F. Noyes and Knapp.

DR. S. THEOBALD, of Baltimore, proposed by Drs. Murdoch and Strawbridge.

DR. SAMUEL B. ST. JOHN, of Hartford, proposed by Drs. Agnew and Carmalt.

DR. J. A. ANDREWS, of Stapleton, S. I., proposed by Drs. Agnew and Webster.

DR. H. W. BRADFORD, of Boston, proposed by Drs. H. Derby and Dennett.

The Committee on Bulletin reported, and the President called upon

1. Dr. H. Knapp, who presented to the Society: (1) "Specimens of a Tumor of the Optic Nerve, occurring in a Child of Five Years," (2) "Specimens of Choroidal Sarcoma," and (3) "Remarks on the Operation for Complicated Cataracts."

The case of "Tumor of the Optic Nerve" was discussed by Dr. T. R. Pooley.

The Chair wished to place upon record the fact that a tumor of the optic nerve was described by Dr. John A. Liddell some twenty years ago.

The operation for complicated cataract was discussed by Drs. Buller, Strawbridge, Agnew, J. Green, Harlan, and Norris.

The Society requested that Dr. Knapp's remarks be reduced to writing, and referred to the Committee on Publication.

2. "A Cosmetic Application of Glasses," by Dr. J. Green.

The Society requested that Dr. Green's remarks be reduced to writing, and referred to the Committee on Publication.

3. "The Influence, on Refraction, of Four Years of College Life," by Dr. Hasket Derby.

Dr. Derby's paper was discussed by Drs. Hutchinson, Car-

malt, Agnew, and Knapp, and was referred to the Committee on Publication.

4. "Dacryocystitis of Nursing Infants," by Dr. Kipp.

5. "A Case of Sarcoma of the Conjunctiva," by Dr. E. Dyer.

6. "Extirpation in Panophthalmitis," by Dr. G. C. Harlan.

Discussed by the Chair, Drs. H. W. Williams, Prout, and Webster.

7. "Remarks on the Use of Atropine in the Treatment of Strabismus," by Dr. J. Green.

Discussed by Drs. Dennett, Knapp, Agnew, and Strawbridge.

8. "Prolapse of Retina, from Hemorrhage following Iridectomy for Glaucoma," by Dr. D. Webster.

Discussed by the Chair, Drs. Green, Williams, and Agnew.

9. "Demonstration of Water Color Drawings of some of the Rarer Forms of Eye Disease," by Dr. W. F. Norris.

10. "The Diffusion Circles of Ametropia," by Dr. A. G. Heyl.

11. "Ischæmia of Retinal Vessels of both Eyes, following Facial Erysipelas," by Dr. D. Coggin.

12. "Paresis of the Superior Oblique Muscle," by Dr. H. D. Noyes (the Vice-President in the chair).

13. "A Case of Apparent Atrophy of the Optic Nerve, in which Recovery of Vision followed the Injection of Strychnia," by Dr. D. Webster.

14. "Remarks on Operations for Entropion," by Dr. J. Green.

15. "A Case of Trial Glasses," by Dr. J. Green.

The above papers were all referred to the Committee on Publication.

The Society then went into Executive Session.

An amendment to the By-Laws, proposed in the Session of 1875, by Dr. H. W. Williams—

"That no action in matters of discipline shall be taken at any session of an annual meeting at which there shall be present less than three-fourths of the members registered as attending such annual meeting.

"A vote of three-fourths of the number thus present shall be necessary for expulsion"—

was adopted by the Society.

The proposed amendment to the By-Laws, by which the number of members of this Society was to be limited to eighty, was lost.

The Society then adjourned.

Evening Session at 7 P.M. The President, DR. NOYES, in the chair. The minutes of the last session were read, and, after amendment, were approved.

The Vice-President, Dr. Norris, took the chair, and the Society listened to a series of communications by the President, entitled:

16. (*a*) "Plastic Operations at the Inner Canthus." (*b*) "Treatment of Extensive Synechia Anterior." (*c*) "Ophthalmoscope with Cog-wheel Attachment." (*d*) "Chart of Visual Field."

Discussed by Drs. Wadsworth, Norris, and Kipp.

The following papers were then read:

17. "Notation of the Angle in Astigmatism," by Dr. J. S. Prout.

18. "Description of a Perimeter," by Dr. W. H. Carmalt.

19. "Statistics of Cataract Extractions," by Dr. H. D. Noyes.

20. (1) "Black Opacity of the Cornea." (2) "Toleration of Foreign Bodies on the Iris," by Dr. Dixon.

Dr. H. W. Williams exhibited a bit of wood seven-eighths of an inch long and three-sixteenths of an inch wide at one end, tapering to a point, which he removed from between the skin and the tarsal cartilage of the upper lid of a boy nine years of age.

It had been forced through the skin, and broken off from the end of a stick which was thrust against the eye by another boy, eight weeks previously. The eyeball was uninjured.

21. "A Case of Intraorbital Tumor of Rapid Growth," by Dr. J. F. Noyes.

The above papers were all referred to the Committee on Publication.

Dr. Robert Sattler, of Cincinnati, was proposed for membership by Drs. Agnew and Pooley.

Adjourned.

July 25th.

Morning Session at 9.30. The President, DR. H. D. NOYES, in the chair. The minutes of the last session were read, and, after amendment, approved.

22. "A Case of Foreign Body in the Posterior Pole of the Lens," by Dr. T. R. Pooley.

Discussed by the Chair, Dr. Agnew, and Dr. Webster.

By invitation, Dr. S. Theobald, of Baltimore, showed his instruments for treatment of strictures of the lachrymal passages, and read his paper upon the same.

Discussed by Drs. Kipp, Green, Dyer, J. F. Noyes, Agnew, and the Chair.

Voted, "That the thanks of the Society be conveyed to Dr. Theobald for his valuable paper, and that Dr. Theobald be requested to allow his paper to be referred to the Committee on Publication."

The Society went into Executive Session.

Upon recommendation of the Committee on Membership, Dr. Stephen Dodge, of Halifax, Nova Scotia, was elected a member of the Society.

The following officers were elected for the ensuing year:

President—DR. HENRY D. NOYES, New York.

Vice-President—DR. W. F. NORRIS, Philadelphia.

Recording Secretary and Treasurer—DR. RICHARD H. DERBY, New York.

Corresponding Secretary—DR. J. S. PROUT, Brooklyn.

Committee on Publication: DR. E. G. LORING, DR. D. B. ST. JOHN ROOSA, } New York.

The report of the Committee, recommending Newport as the place for the next annual meeting, and that Dr. H. G. Miller, of Providence, be a local committee to secure a suitable room for the meeting, was adopted.

The Society then resumed Open Session.

Dr. B. Joy Jeffries read a paper on (*a*) "Color-Blindness and Tests." (*b*) "Visual Standards," and offered demonstrations of colored worsteds.

It was moved by Dr. John Green:

"That a medical stenographer be employed to report the discussions at the next meeting of the Society, the stenographer's manuscript to be submitted to the Committee on Publication, with authority to condense and edit the same for publication in the Transactions."

This resolution was seconded and carried.

It was moved by Dr. J. S. Prout:

"That the Secretary, about June 1st, send a request to each member to forward the titles of such papers as he desires to present at the next meeting of the Society, and that such titles be incorporated by the Secretary in the printed call for the meeting, such papers to have precedence over all others."

This motion was also seconded and carried.

On motion of Dr. J. S. Prout:

Resolved, That the American Ophthalmological Society recommend the adoption of Javal's notation in prescribing cylindrical and prismatic glasses, viz., that the zero point be taken at the *left* of the horizontal meridian (in the position of the glass as when the patient looks through it), and that the degrees of inclination of the axis of the cylindric glass, and the position of the base of the prism, be expressed in degrees counting upward around the circle from this zero to 360°.

Moved by Dr. E. Dyer, and seconded by Dr. J. Green:

"That no paper be allowed to go on the Bulletin, unless the paper be in manuscript, or the author verbally communicates the subject-matter of his paper to the Society, and that, in the case of papers read only by title, the Committee on Publication shall have power to accept or to reject them at their discretion."

Carried.

Dr. J. Green offered a resolution to the effect that Dr. B. J. Jeffries be requested to make such arrangement as he may find to be practicable, to enable the members of the Society and others to procure suitable collections of colored worsteds for testing for color-blindness.

This resolution was adopted.

The minutes of the present session were read and approved, after which, on motion, the Society adjourned to meet at Newport on the fourth Thursday of July, 1880.

RICHARD H. DERBY,

Secretary.

The following members were present at the meeting of July, 1879:

DR. C. R. AGNEW.....New York.
DR. F. BULLER.....Montreal.
DR. W. H. CARMALT.....New Haven, Conn.
DR. DAVID COGGIN.....Salem, Mass.
DR. W. S. DENNETT.....Boston, Mass.
DR. HASKET DERBY.....Boston, Mass.
DR. JOHN H. DIX.....Boston, Mass.
DR. LEWIS S. DIXON.....Worcester, Mass.
DR. E. DYER.....Pittsburgh, Pa.
DR. JOHN GREEN.....St. Louis, Mo.
DR. G. C. HARLAN.....Philadelphia, Pa.
DR. A. G. HEYL.....Philadelphia, Pa.
DR. EDWIN HUTCHINSON.....Utica, N. Y.
DR. B. JOY JEFFRIES.....Boston, Mass.
DR. CHARLES J. KIPP.....Newark, N. J.
DR. H. KNAPP.....New York, N. Y.
DR. F. B. LORING.....Washington, D. C.
DR. S. F. MCFARLAND.....Oxford, N. Y.
DR. C. S. MERRILL.....Albany, N. Y.
DR. H. G. MILLER.....Providence, R. I.
DR. W. F. NORRIS.....Philadelphia, Pa.
DR. H. D. NOYES.....New York, N. Y.

DR. J. F. NOYES.....Detroit, Mich.
DR. O. D. POMEROY.....New York, N. Y.
DR. T. R. POOLEY.....New York, N. Y.
DR. J. S. PROUT.....Brooklyn, N. Y.
DR. G. T. STEVENS.....Albany, N. Y.
DR. GEORGE STRAWBRIDGE.....Philadelphia, Pa.
DR. J. J. B. VERMYNE.....New Bedford, Mass.
DR. O. F. WADSWORTH.....Boston, Mass.
DR. DAVID WEBSTER.....New York, N. Y.
DR. H. W. WILLIAMS.....Boston, Mass.

ON THE OPERATION OF SOME KINDS OF COMPLICATED CATARACT. By Dr. H. Knapp, of New York.

Among the complicated cataracts there are two kinds on which I beg to make some remarks concerning their removal: I mean the hypermature cataract with thickened capsule, and the cataracts complicated with fluidity of the vitreous.

As to the former, I previously used to operate for them by extraction according to the regular peripheric linear, *i. e.*, Von Graefe's method, circumcising the patch of thickened capsule with a sickle-shaped needle as well as I could, and afterward extracting the central thickened piece with the cystotome or iris-forceps, either before or after the expulsion of the lens. The results of this procedure were commonly good: they did not, at least, essentially differ from those obtained in the ordinary forms of senile cataract. Yet, when I gave up the excision of a central piece of the anterior capsule, as a general method, replacing it by the peripheric division of the capsule, the central thickening of the anterior capsule seemed to be particularly unfavorable for the peripheric opening. In *the first place*, it would seem as though hard cataracts, the cortex of which was partially converted into a kind of connective tissue and intimately united to the capsule, could not find an easy exit through a peripheric opening. This apprehension was not verified by experience. In all cases of hypermature cataract with thickened capsule, the lens slipped out with the greatest ease through a peripheric opening, provided the opening was large enough. I may here repeat what I have stated elsewhere, that in large, perfectly mature or hypermature hard cataracts, a larger section of the capsule is required than in soft cataracts, or cataracts with a soft cortical substance. The insufficient opening of the capsule will render the expulsion of the hard and large lens difficult and dangerous, acting prejudicially in the same manner as does an insufficient corneal section. A T-shaped opening, with a long horizontal line along the corneal section, and a small vertical one in the centre of the coloboma—which, as far as my experience goes, offers the most favorable conditions for the exit of the lens—seems to enjoy only a limited utility in hypermature cataract with a thickened

capsule, since the compact lens, on its way out, cannot enlarge the vertical line of the opening as far as its thickness would require, but only as far as the margin of the thickened part of the capsule. If, then, the capsular opening be insufficient, considerable outward pressure has to be employed in order to make the cataract enlarge the horizontal incision. This, of course, will only be the case when also the peripheric part of the capsule is tough and resistent, a condition of the occurrence of which I have repeatedly satisfied myself by experience. The modes in which the outgoing lens may dilate an insufficient horizontal incision are described in a paper of mine in the just published number of the Archives of Ophthalmology.[1]

I am, therefore, particularly careful to make a large horizontal incision into the capsule in all cases of hard cataract, and in doing so I have never found that the central thickening of the capsule, even when it was very extensive, offered any obstacle to the easy exit of the lens.

In *the second place*, the thickened capsule, if left in the eye, seems to preclude the recovery of good vision, and from this reason almost all operators have made it a rule to extract it either before or after the exit of the lens. From what I have seen during the last two years, I can state that the thickened capsule, when left in the eye, is by no means an insurmountable obstacle in the way of recovering good vision. It can even be easily dealt with. If it fills a part of the pupil, even a small part only, it should be put out of the way, since the part of the pupil which it obstructs is optically the most important. In such cases I have always made a horizontal incision into the capsule along the upper border of the thickened part, then a vertical one above the horizontal and joining the latter in the centre, and lastly couched the thickened portion behind the iris. This procedure has, thus far, invariably given me good results. On the mode of the secondary division of the capsule, the instruments best adapted for that purpose, the time when it should be done, etc., I have spoken of at length in the just quoted paper, under the head of After-operations.

The *second kind* of cataracts on which I beg to make some remarks are cataracts complicated with marked fluidity of the vitreous. I do not mean the partial or limited fluidity of the vitreous which we frequently find—for instance, in many cases of near-sighted eyes, and which require no particular precaution—but I mean those cataracts

[1] Report on a Sixth Hundred of Cataract Extractions. Vol. viii., p. 220.

where the previous examination with the ophthalmoscope and the functional examination have demonstrated deeper changes in the interior of the eye. The corneal section, in such cases, should be less peripheric than usual. The course and issue of the corneal section are the practical test of these cases, furnishing the indications for the further steps of the operation. If no vitreous has escaped during the corneal section, and the cataract is not considerably dislocated downward, it will be well to proceed with the operation in the usual manner. But when, during the corneal section, fluid vitreous oozes out, an iridectomy will only favor the escape, and neither the ocular tension nor external pressure will have a great influence on the expulsion of the cataract, but tend to increase the outflow of the vitreous, necessitating some kind of "accouchement forcé" with all its disastrous consequences. Now, I think that in such cases *an iridectomy does more harm than good, and ought not to be made.* When, during the corneal section, fluid vitreous escapes, showing that the suspensory ligament is defective or torn, I imagine that the iris, left in position, will to a certain degree supply the protection which the vitreous receives from the zonula Zinnii. Acting on this principle, I have recently removed two such complicated cataracts without iridectomy, and the results were so unexpectedly good as to encourage me to give the procedure a more extensive trial. In one of these cases, with M. $\frac{1}{8}$ in the other eye, with a high degree of rarefaction of the whole choroid, such an abundant quantity of watery vitreous flowed out during the section and at every muscular effort of the patient as well as at every touch on the eye, that I almost despaired of being able to remove the cataract at all. I made no iridectomy, but divided the capsule as freely as was possible under the circumstances. The iris receded, the anterior chamber was deep, and the lens did not yield to the usual manœuvre of pressing on the cornea with a spoon; on the contrary, it seemed to sink more deeply into the eye, and more vitreous escaped. Then I removed the lid-speculum, gave the eye rest for some minutes, and tried to expel the lens by methodical pressure with my fingers and the patient's eyelids. With my left index I pressed the upper lip of the wound back toward the centre of the eye, and with my right index I pressed the edge of the lower lid upon the inferior part of the cornea, the pressure likewise directed toward the centre of the eye. This made the wound gape and the lens present, upon which I pushed the edge of the lower lid, while continuing the pressure, upward toward the corneal section, and had the pleasure of seeing the cataract escape

without further loss of vitreous. The recovery was undisturbed, and the patient discharged three weeks after the operation, with a central pupil and good sight. The other case was operated on in the same way; the lens, however, was only partially removed, since it split into segments. The remainder, about one-third of the whole lens, was gradually absorbed, leaving a clear central pupil and very good sight.

INFLUENCE, ON THE REFRACTION, OF FOUR YEARS OF COLLEGE LIFE. By Hasket Derby, M.D.

Most of the published statistics of refraction have been gained by examinations of all the pupils attending the school, gymnasium, or college, where the examination was conducted, at one given time. It is somewhat remarkable that so little has been done toward carrying out the suggestion of Donders that repeated examinations of the same individuals should be made at different periods of their educational career. Could this be done on an extensive scale, it is clear that valuable and comparatively accurate information might be gained on several very interesting points, especially with reference to the age at which and the individuals in whom myopia is most apt to be progressive; the circumstances under which this disease is developed from emmetropia of considerable duration; the rate of its progress at different ages, and the result of measures taken to arrest its advance. It is evident that statistics thus gathered would be more accurate, as well as more reliable, than those obtained by a single inspection of the classes of different years.

With a view of making a small contribution to such researches, I visited Amherst College in 1875, and examined the class entering that year, intending to follow at least four successive classes through their college course. Each year, up to and including the present, a fresh class has been examined at its entrance, and the results carefully recorded. The class of 1879 has now completed its full term of four years, and the eyes of its members have undergone their final examination. Intending, as I do, to make an extended report three years hence, it has still seemed right to communicate to the Society even the scanty figures as yet brought together, in the hope not only that others may be induced to pursue similar investigations, but that

the method I have employed may possibly be criticised, or suggestions made that will give a greater value to the results to be obtained from the three remaining classes.

Though the classes themselves were comparatively small, and the age at which the men entered college precluded the probability of any excessive or startling change of refraction, it was felt that the results of this course of examinations, whether positive or negative, would yet furnish some valuable information on the points already alluded to.

The commonly accepted statement, moreover, that the greatest and most important changes in refraction are apt to take place between the fifth and twentieth year, is fully supported by facts, as far as they go. But most investigations have stopped at this age. The changes that may take place after twenty, and the rate at which they go on during the subsequent years of educational life, have never, as yet, been made to any extent the subject of accurate inquiry. Here was an opportunity for work in this direction.

Every facility for the prosecution of these investigations was afforded me by the authorities of Amherst College, through Dr. Hitchcock, the Professor of Hygiene. One indispensable requisite was that the whole class should be examined, and in accordance with this the attendance of each student was made obligatory.[1] With rare exceptions every individual of each class was present. They were admitted to the examination room singly, in order that no familiarity with the process might be acquired in advance. Snellen's letters were used, six metres away, lit up by two strong kerosene burners, which were placed behind a screen. Uniform illumination was thus attained at every examination. A separate record was made for each eye. It is only since 1876 that metric glasses have been used, but for the sake of uniformity all the results are stated in metric terms. To avoid error, in stating slight changes of refraction, the old glasses were used at the final examination of the present class, and the metric reduction effected afterward.

It will be seen that I have included very slight degrees of ametropia, although some investigators have not reckoned in a myopia of less than one dioptric ($-\frac{1}{36}$). I fail to see the justice of this ar-

[1] I had hoped to have carried out a series of similar examinations among the undergraduates of Harvard, but failed of sufficient support from the Faculty, who declined to require the attendance of students, although doing all in their power to encourage the presence of volunteers. Under these circumstances only half the class attended. No reliable statistics could therefore be obtained.

bitrary limitation. If vision, previously less than normal, is made perfect by the use of —0.5 D, there is no valid reason why that amount of myopia should not be recorded. I have therefore followed the example of Emmert [1] in so doing, and have stopped there, as this corresponds to the weakest glass of the old trial case.

The results I obtained with the class of 1879 may be briefly stated in tabular form. At its entrance the number of members was 83, who were examined for the first time Nov. 16, 1875. 61 of those previously examined presented themselves again June 2, 1879. These alone are included in Table I.

The average age at entrance was 21.

TABLE I.—Refraction of Class of 1879.

	November, 1875.		June, 1879.	
	Cases.	Percentage.	Cases.	Percentage.
Emmetropia	31	50.8	22	36.0
Hypermetropia	3	5 0	8	13.2
Myopia	27	44.2	31	50.8

That a better idea may be obtained of the average refraction found among the students who enter this college, I give a second table, made up of all the cases I have examined at entrance, 321 in all, and comparing their percentage with that of this class.

TABLE II.

	Whole class of 1879 at entrance.	Four classes at entrance.
	Percentage.	Percentage.
Emmetropia	49.4	45.2
Hypermetropia	6.0	20.9
Myopia	44.6	35.9

[1] Refractions- und Accommodations-Verhältnisse des menschlichen Auges, von Dr. E. Emmert. Bern. 1877.

The myopia of this class is thus shown to be in excess, and the hypermetropia considerably less than was found with the other classes. The above figures do not bear out Emmert's theory [1] that hypermetropia is the most frequent condition of refraction among all people, and at every age.

Analyzing now the myopia found at entrance and at graduation, we find the following figures:

TABLE III.

1875.		1879.
Percentage of Myopia less than 1 D....	23	25.8
Percentage of Myopia equal to, or exceeding 1 D.....	21	24.2
	44	50

and, finally,

TABLE IV.

	CASES.		PERCENTAGE OF WHOLE CLASS.
During College Course of four years.	Myopia developed from previous Emmetropia in.....	7	10.6
	Increased its amount, in.....	14	21.2
	Remained unchanged in	11	16.6

I have appended two tables of individual cases. The first shows the amount of change from emmetropia to myopia. The other sets forth, in the same way, the amount of increase of existing myopia in each case, accompanied, whenever possible, by remarks on the character and habits of the individual.

[1] L. c., p. 45.

TABLE V.—CHANGES FROM EMMETROPIA TO MYOPIA IN DIOPTRICS.

INITIALS.	AGE AT ENTRANCE.	ORIGINAL EXAMINATION AND DATE.	FINAL EXAMINATION AND DATE.	REMARKS.
G. R. B.	17	Nov. 16, 1875. O. D. Em. O. S. Em.	June 2, 1879. O. D. Em. O. S. My. 0.5 D.	
C. R. B.	21	Nov. 16, 1875. O. D. Em. O. S. My. 0.5 D.	June 2, 1879. O. D. My. 0.5 D. O. S. My. 0.5 D.	
E. P. C.	18	Nov. 16, 1875. O. D. Em. O. S. Em.	June 2, 1879. O. D. My. 1 D. O. S. My. 1 D.	
D. A. N.	20	Nov. 16, 1875. O. D. Em. O. S. My. 0.75 D.	June 2, 1879. O. D. My. 0.75 D. O. S. My. 1.25 D.	Average student.
O. J. S.	17	Nov. 16, 1875. O. D. My. 0.5 D. O. S. Em.	June 2, 1879. O. D. My. 0.5 D. O. S. My. 0.5 D.	
A. W. S.	16	Nov. 16, 1875. O. D. Em. O. S. Em.	June 2, 1879. O. D. My. 1.25 D. O. S. My. 1 D.	Small staph. post. has developed in each eye since first examination. A very hard student, has worked injudiciously.
F. D. K.	20	Oct. 25, 1876. O. D. Em. O. S. Em.	June 2, 1879. O. D. My. 0.75 D. O. S. My. 0.75 D.	Examined first in Nov., 1875. Then apparent My. 0.5 D. in each eye, due to spasm of accommodation. The next year Em. in each eye. At last examination the ophthalmoscope showed true Myopia.

TABLE VI.—INCREASE OF EXISTING MYOPIA.

INITIALS.	AGE AT ENTRANCE.	ORIGINAL EXAMINATION AND DATE.	FINAL EXAMINATION AND DATE.	REMARKS.
G. M. A.	20	Nov. 16, 1875. O. D. My. 1 D. O. S. My. 1 D.	June 2, 1879. My. 1.5 D. My. 1.5 D.	
W. C. B.	17	Nov. 16, 1875. O. D. My. 0.5 D. O. S. My. 0.75 D.	June 2, 1879. O. D. My. 0.5 D. O. S. My. 2 D.	
A. S. C.	22	Nov. 16, 1875. O. D. My. 0.75 D. O. S. My. 0.75 D.	June 2, 1879. O. D. My. 1.5 D. O. S. My. 1.5 D.	A very hard worker.
C. B. G.	18	Nov. 16, 1875. O. D. My. 0.5 D. O. S. My. 0.5 D.	June 2, 1879. O. D. My. 0.75 D. O. S. My. 0.75 D.	Good student.
G. F. J.	16	Nov. 16, 1875. O. D. My. 1 D. O. S. My. 1.5 D.	June 2, 1879. O. D. My. 1.5 D. O. D. My. 1.5 D.	First scholar in class.
D. A. N.	20	Nov. 16, 1875. O. D. Em. O. S. My. 0.75 D.	June 2, 1879. O. D. My. 0.75 D. O. S. My. 1.25 D.	Average student.
L. E. P.	21	Nov. 16, 1875. O. D. My. 1.5 D. O. S. My. 2.5 D.	June 2, 1879. O. D. My. 3 D. O. S. My. 3.5 D.	A very assiduous reader.

TABLE VI.—INCREASE OF EXISTING MYOPIA—*Continued.*

INITIALS.	AGE AT ENTRANCE.	ORIGINAL EXAMINATION AND DATE.	FINAL EXAMINATION AND DATE.	REMARKS.
W. A. S.	17	Nov. 16, 1875. O. D. 1.25 D. O. S. 1.5 D.	June 2, 1879. O. D. My. 1.75 D. O. S. My. 2.25 D.	Hard worker.
S. H. S.	20	Nov. 16, 1875. O. D. My. 6.5 D. O. S. My. 6 D.	June 2, 1879. O. D. My. 7 D. O. S. My. 8 D.	
H. H. S.	19	Nov. 16, 1875. O. D. Em. O. S. My. 0.5 D.	June 2, 1879. O. D. Em. O. S. 1 D.	
A. D. S.	24	Nov. 16, 1875. O. D. My. 1 D. O. S. My. 1.5 D.	June 2, 1879. O. D. My. 1.5 D. O. S. My. 1.75 D.	
G. A. W.	15	Nov. 16, 1875. O. D. My. 1 D. O. S. My. 1.75 D.	June 2, 1879. O. D. My. 1.25 D. O. S. My. 4 D.	Very indolent, except with his microscope. For this he uses the right eye.
N. M.	21	Oct. 24, 1876. O. D. My. 0.5 D. O. S. My. 0.5 D.	June 2, 1879. O. D. My. 1 D. O. S. My. 1 D.	Hard worker, studies much before breakfast.
F. R. H.	20	Oct. 24, 1876. O. D. My. 0.5 D. O. S. My. 0.5 D.	June 2, 1879. O. D. 0.75 D. O. S. 0.75 D.	

DACRYOCYSTITIS IN NURSING INFANTS.

By Charles J. Kipp, M.D., Newark, N. J.

With regard to the frequency of this disease in early life, Schirmer, in his monograph on Diseases of the Lachrymal Apparatus, in Graefe and Saemisch's *Handbuch der Augenheilkunde*, says: "It is certain that children are less often afflicted with dacryocystitis, and infants at the breast have till now been considered exempt from this disease. Critchett is the only one who has repeatedly seen this affection in the new-born. Helling and Caron have each observed one case. I, myself, have seen dacryocystitis of the right side combined with blepharitis in a child seven months old."

Judging from my own experience, this disease is by no means infrequent among infants here. An examination of my records shows that, of the total number of cases of eye disease registered during the last two years, 3.6 per cent. suffered from diseases of the lachrymal sac. Of these, ten per cent. were under one year of age. In most of the infants the disease was first observed shortly after birth; in several phlegmon of the sac was present. In all of them the secretion was purulent and very abundant. In twenty-five per cent. of the cases of lachrymal blennorrhœa the patients were under ten years of age.

So far as I have been able to observe, this disease is in infants almost always associated with nasal catarrh. In several of the cases carious bone was discovered by the probe at the first examination. *In none of the cases which I had an opportunity to probe, could a stricture be felt.*

The plan of treatment which has been most successful in my hands is as follows. Unless the sac can be easily emptied by slight pressure, the lower canaliculus is split. After that the nurse is instructed to evacuate the sac as often as every hour, and to remove the secretion from the conjunctival sac. If there is much swelling of, and secretion from, the Schneiderian membrane, I remove the secretion covering it by means of absorbent cotton, wrapped around a dentist's cotton-holder, and then apply a one or two per cent. solution of nitrate of silver to the swollen membrane by means of a large camel's-hair pencil once a day. I never use injections into the nose

in infants, having seen more than one case in which, even in careful hands, they were followed by purulent inflammation of the middle ear. If the disease does not get well, under this simple treatment, in the course of three or four weeks, I use Bowman's probes, and injections of astringents in the same manner as in adults.

CASE OF SARCOMA OF THE CONJUNCTIVA. With Woodcuts. Reported by E. Dyer, M.D., Pittsburg, Pa.

Ella P., æt. 6, a remarkably bright and healthy child, was brought to me November 11, 1878, presenting the following condition of the left eye: Marked exophthalmus; eyeball turned inward 45°, with very little power of movement. No intolerance of light. Reads Sn. X at 1'. No pain. The lids externally healthy, but I could not evert them, nor can she close them; they being 15 mm. apart in the median line. This condition is caused by a large tumor of the conjunctiva, which commences a little to the inside of the median line of the cornea, both above and below, and involves the whole conjunctiva of the ball to the outer canthus, presenting the appearance of chemosis, except that it does not rise so abruptly from the margin of the cornea and is more brilliantly red. The surface is covered by very fine granulations. The conjunctiva near the inner canthus is clear and healthy. Only a small spot of it can be seen, however, as the eye is turned so much inward. The child had been under observation before, and Dr. Lippincott, who first saw the patient, kindly sends me the following notes:

"I saw the case July 3, 1878; at that time the growth was about the size of a nickel three-cent piece (17 mm.), and presented somewhat the appearance of a mucous polyp. It was of a pinkish color, soft, slightly lobulated, and flattened between the lids and the globe. It was attached, at the outer canthus, to the palpebral and ocular conjunctiva by a pedicle about one-fifth of an inch in diameter. The eyeball was not limited in its movements by the growth, which, when the patient looked outward, covered the cornea to the extent of a line, and when she looked inward, was half an inch from the corneal margin. Three or four moderately large veins run from the tumor to the eyeball, but, apart from that, there was no noteworthy vascularity. The child did not complain of any pain or uneasiness. The parents stated that they noticed the trouble about three months before."

The parents then took the child to a man who, on July 8th, removed the growth "with complete success." It soon began to reappear, and on the 7th of October he removed a "large tumor from the lower eyelid, which looked like fat." As near as I could make out, from the parents' statement, it was the size of an almond; but they insisted that the entire growth was removed, and there was neither exophthalmus nor was the motion of the eye impaired. The

mass, therefore, which was presented to me, was evidently the growth of one month. I advised enucleation of the entire contents of the orbit, but was not allowed to do it until the 16th of November, nearly a week after my first examination. The tumor, in the meantime, had increased very perceptibly in size. I divided the external canthus to its fullest extent and removed the bulb, and, as well as I could see, everything but healthy tissue. The cavity was then very thoroughly cauterized with solid nitrate of silver. Much less hemorrhage than expected. Cold water dressings.

The mass removed (which was not attached to the bulb) was as large as an English walnut, and proved, under the microscope, to be sarcoma (spindled celled). The child was up and cheerful the next day, and there was every prospect of speedy recovery. On the sixth day, however, I noticed that the lids began to be bulged out, and on the seventh I was satisfied that the growth had commenced again, and that the conjunctiva of the lids was involved. The tumor grew rapidly, and soon a swelling was noticed 2.50 cm. in front of the angle of the jaw, soft, movable, and not painful. On consultation

it was determined to remove the tumors with the entire eyelids and fill the orbit with chloride of zinc paste. The parents *positively* refused to allow any further operative interference, and we were obliged to abandon the little sufferer to her fate.

I do not care to dwell on the subsequent history of the case, there was no treatment except opiates. Both tumors grew rapidly, especially the one in front of the ear. On January 22, 1879, the integument gave way, and there was a loss of eight ounces of blood; as estimated from the cutaneous vessels. Soon the skin of the upper

Dr. Dyer's case of sarcoma of conjunctiva.

Dr. Dyer's case of sarcoma of conjunctiva.

urst, followed by alarming hemorrhage. As the tumors grew in the fissures in the skin were wider opened, and, as the vessels ruptured, fresh hemorrhages occurred. As I lived at a dis- e from the patient, I never saw one of them, but Dr. McKelvy, was near at hand, tells me that there were twelve or more; that were very sudden and copious, eight to ten ounces, but that they venous and had generally ceased by the time he arrived, and evidently cutaneous. The accompanying photographs show size of the tumors March 25th. They grew rapidly, and the

l died May 5th. She had dwindled to a mere skeleton, as will een from a cast taken after death.

he tumor of the neck measures 56 cm. in its greatest circum- nce. That of the orbit 33 cm.

n autopsy was refused, but external examination gave no evi- ce of disease of the internal organs. My own examination of s of the tumors is confirmed by Dr. Gallaher, who writes me: hey contain numerous spindle-shaped cells with partial fibrilla- , and there is no doubt that the new growth is what is called urrent fibroid,' or spindle-celled sarcoma. The fibrillation is marked."

EXTIRPATION IN PANOPHTHALMITIS. By G. C. HARLAN, M.D., Philadelphia, Pa.

MY object in introducing this subject is to elicit the opinion of the Society as to the propriety of the operation, and to learn what may be the general practice in regard to it. As is well known, v. Graefe advised against extirpating an eye in a state of panophthalmitis, on the ground that the danger of consequent meningitis was so great as to render the operation entirely unjustifiable.

The occurrence of descending optic neuritis has been established, and the disease has been traced, in post-mortem examination, along the nerve, from the brain to the eye; but I have been unable to find any positive proof of such a thing as an ascending neuritis extending from the eye to the brain, though cases are recorded that make it probable. Cases have been reported of meningitis following enucleation in panophthalmitis, ending, in some instances, in recovery,[1] and in others in death. At least six of the latter are recorded,[2] and it was upon these that v. Graefe based his advice. I have endeavored to analyze these cases, but could find detailed accounts of only three of them. Pagenstecher, who reported one of the fatal cases, made a careful examination of the optic nerves, and found them normal. He thinks the meningitis was set up by the purulent choroiditis, and not by the operation. For fourteen days before the operation there had been sleeplessness, loss of appetite, and intense headache, and sympathetic ophthalmia had existed for five days. The patient was much relieved at first, but had a violent chill twenty-four hours after the operation, and seventy-four hours after the operation died of meningitis. In another of the cases, by Just, the symptoms of meningitis did not appear until eight days after the operation; no post-mortem. In still another case, Horner found meningitis which could not in any way be traced to the enucleated eye.[3]

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[1] Royal London Ophthalmic Hospital Reports, Dec., 1877, p. 252.

[2] Annales d'Oculist, Nov., 1873, p. 253, and Jan., 1875, p. 15; Klinische Monatsblätter für Augenheilkünde, 1872.

[3] Schussverletzungen des Auges: H. Cohn, p. 12.

cases is a very small proportion of the enormous number of ations performed in the last twenty or thirty years, in many of it may be taken for granted that the eyes were in a state of thalmitis, and, unless we suppose that there has been a fatal n many unreported cases, the accidents have been scarcely ous enough to establish a rule of practice. Cohn reports cases[1] in which he performed enucleation during the acute f purulent panophthalmitis without unpleasant results, and inclined to throw the weight of his authority against the of v. Graefe. Arlt says: "Should, however, panophthalmitis eady established, the operation of enucleation cannot be con- free from danger."

ve, in a number of instances, in the past year or two, extir- balls in a state of acute general inflammation, and have some- ad occasion to regret not having taken the risk. Two cases were under treatment at the same time, at the Wills' Hospital, rve as illustrations. One, that of a man whose eye had been three weeks before by a piece of steel, which was supposed till in the ball. He suffered agonizing pain, which was only y relieved by large doses of morphia, and was unable to leave d. The ball was enucleated and found not to contain a body, but there were abscess of the vitreous, iridochoroiditis, autifully marked neuritis. All symptoms ceased at once, and tient was restored to his work in a few days. In the other ppurative panophthalmitis was excited by a rather desperate t to let a little light into a disorganized and staphylomatous iet eye by iridectomy. The front of the ball was abscised, several days there were great chemosis, enormous swelling nsion of the lids, considerable hemorrhage from the choroid, in almost as severe as before the operation, and a suppurating remained which required treatment for several weeks. This elieve, not a very unusual experience after abscission, and is considering in weighing the comparative risks and advantages cleation.

e it is a significant fact that the reported deaths after enucle- ave all occurred in cases of suppurative panophthalmitis, it is emembered that these are just the cases in which, supposing ease of the brain to originate in the eye, it is most possible to ve that meningitis might have been excited without the opera-

[1] Schussverletzungen des Auges: H. Cohn, p. 12.

tion. Any case of death that may occur under these circumstances should be carefully reported, and an earnest effort should be made to establish or disprove the connection between the operation and the meningitis.

Enucleation gives the patient so much more certain and immediate relief from present suffering and future inconvenience and danger than any partial operation, that it is a matter of great importance to decide whether v. Graefe was right in forbidding its performance in panophthalmitis.

PROLAPSE OF RETINA, IN CONSEQUENCE OF HEMORRHAGE, FOLLOWING IRIDECTOMY FOR GLAUCOMA.

By David Webster, M.D., of New York.

Profuse hemorrhage from the choroidal blood-vessels, following the operation of iridectomy or of cataract extraction, is, fortunately, of very rare occurrence, as it is always necessarily fatal to vision, and usually, if not invariably, results in more or less atrophy of the eyeball. I have seen only one or two cases of the kind besides the one here reported, and I have heard of one or two others, but, so far as I can learn, in no other case has a portion of the retina been carried out through the wound by the gush of blood. More or less vitreous humor is, of course, always expelled by and with the blood in these cases.

Dr. John H., æt. 35, consulted Dr. C. R. Agnew, Dec. 30, 1878. He had divergent strabismus of his left eye, the sequel of small-pox in childhood. Two years previously the left external rectus had been divided, with partial correction of the deformity. As long as he can remember he has had only perception of large objects with that eye, being able to distinguish a man from a woman, but never much more.

Since the section of the external rectus he has had several attacks of congestion in the amblyopic eye, but an attack would last only a few days. During these attacks the vision was worse than usual, the pupil was dilated, and there was severe supra-orbital neuralgia confined to that side. The present attack came on twelve days ago. The circumorbital pain has been less severe than on former occasions, but there has been no cessation. There is circumcorneal in-

l haziness of the cornea. The pupil is slightly dilated and ıe tension increased. For the last five days the vision duced to perception of light. A drop of a four-grain so- lphate of atropia was applied to the eye, and the patient me again the next day.

—The eye has felt easier since atropine was dropped upil is widely dilated, but the vision is no better. The iliary veins are enlarged and tortuous. The tension is ed. For the last few days he has observed halos about ght eye, vision $\frac{20}{200}$; Hm. $\frac{1}{15}$. Left eye, sees large objects ut, but cannot count fingers. The patient says the sen- ght is like that of a deep twilight in that eye. Examined hthalmoscope, the right eye shows no deviation from the ept the error of refraction. Of the left eye, the cornea f milk-and-water look, and, by oblique illumination, it ap- ough its anterior surface had been teased, or picked up, infinite number of little opaque spots on the surface. can be faintly seen by the direct method, through $+\frac{1}{10}$, ole disk can be seen to be capped, but the depth of the cannot be measured.

ent was kept at the office three hours, during which a one olution of sulphate of eserine was dropped into the eye s contracted the pupil, but did not lessen the tension, or y appreciable improvement in the eye, either subjective e. It was therefore thought best to do an iridectomy e with as little delay as possible.

. M. the patient was anæsthetized by means of chloroform, dministered to himself until unconscious, and a broad, clean iridectomy upward was performed by Dr. Agnew, myself.

s no bleeding into the pupil, or other complication. No put into the eye, and both eyes were dressed with ab- ton, a flannel bandage, and a mask of black silk.

P. M. I called on the patient again, and was surprised to severe pain, and the dressings saturated with blood. He about one hour after we left him violent vomiting set in, elieved to be due to the chloroform. During one of his prolonged expulsive efforts he distinctly "felt something in his eye, and at the same time the eye became the seat t excruciating pain. The bleeding was observed soon lood having made its appearance through the dressings.

I thought that the removal of the dressings might encourage the bleeding. I therefore allowed them to remain, and gave, hypodermically, mag. sol. morph. min. x., to relieve the pain.

January 1, 1879.—The morphia relieved the pain, and the doctor rested well. Removed the dressings, washed the eye open, and found the anterior chamber filled with blood, and a large blood-clot protruding from the widely-gaping wound. Bandaged this eye and left the other open and protected by a shade.

January 2.—The doctor rested well last night under chloral hydrate and codeine. Dr. Agnew thinks the mass protruding from the wound consists of blood, vitreous, and prolapsed retina.

January 7.—The eye got along with comparative ease until early this morning, when pain set in, which has continued moderately all day. There is considerable redness of the ciliary region. Ordered iced cloths and atropine.

January 9.—Dr. H. went to see a patient last night, for the first time since the operation. The eye has been more painful since. Injected, hypodermically, mag. sol. morph. min. x.

January 11.—Patient slept well last night without anodyne. The redness is less, but the membranous mass protruding from the wound and hanging down over the cornea gives rise to a good deal of irritation.

January 14.—While the eye was held open by an assistant I carefully snipped off with scissors, close to the wound, the light colored membranous mass, which seemed to be attached to some part of the interior of the eye, and which showed no signs of disappearing by natural processes.

January 16.—The eyeball is decidedly less red, and the doctor has experienced great relief from the absence of the substance which was excised two days ago. This substance has been examined by Drs. H. Moeller and E. L. Macwithey, of New York, both skilled in the use of the microscope, and has been found to consist of *retina*, the layer of rods and cones being easily recognized.

January 21.—The patient is able to come to the office. The eye is much improved; the lens is in its place, and behind it is an irregular, opaque mass, probably the remaining portion of the detached retina, with a changed vitreous humor. The doctor was permitted to commence work gradually, using spectacles $+\frac{1}{18}$.

February 15.—Eye still a little red, moderately shrunken, and with diminished tension.

August 2.—Upon opening the eyelids widely, atrophy of the globe

lent, but, to a casual observer, there would scarcely seem ing amiss with the eye.

ry of this case shows, beyond reasonable doubt, that the the choroidal blood-vessels was directly due to the vom- ced by the chloroform. Indirectly, the hemorrhage was, avored by the large amount of pressure removed from the blood-vessels of the interior of the eye by the dimin- ocular pressure resulting from the removal from the eye ous humor, and a portion of the iris. I have no doubt ng from ether would have produced the same effect had it y violent, and I think it wonderful that the same accident ccur more frequently, when I consider how often we t vomiting following operations by which a considerable external pressure is removed from the walls of the cho- retinal blood-vessels.

TRATION OF WATER-COLOR DRAWINGS OF OF THE RARER FORMS OF DISEASES OF EYE. By Wm. F. Norris, M.D. Philadelphia, Pa.

were exhibited :

lar New Growth in the Vitreous.
rrent Papilloma of the Corneo-Scleral Junction.
coma of the Iris.
mata of the Iris and Ciliary Body.
sis of Conjunctiva and Cornea, following long-standing Trachoma.

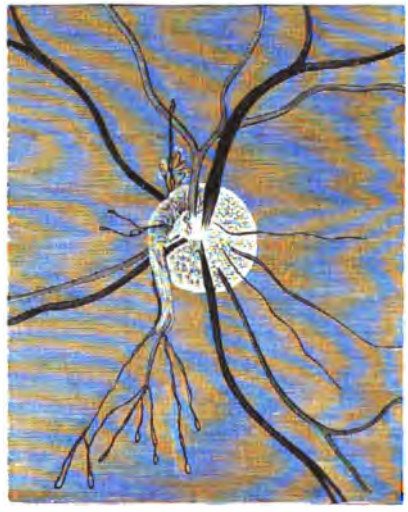
the first two are capable of tolerably satisfactory repre- y woodcuts, and are here reproduced, with histories of

VASCULAR NEW GROWTH IN THE VITREOUS.

æt. 28, an unmarried Irish girl, of light hair and florid , with all the external appearances of being well nour- in good health, and without any marks or history of spe-

cific disease, presented herself, July 13, 1877, complaining of dim vision, and stating that in February previous, for two days and a night, she had had such severe headache "that she almost went crazy," and that about a month afterward the eyesight commenced to fail. Inasmuch as she cannot read, it is difficult to determine accurately the acuity of vision, but it is probably about $\frac{2}{40}$ for the right eye, while in the left she can barely distinguish motions of the hand. The irides are blue and reasonably prompt in their response to light and shadow, the corneæ are clear, conjunctivæ healthy, and there are no marks of any previous inflammation of the eye.

The ophthalmoscope shows in the left eye great diffuse haziness of the vitreous, with numerous large black flocculi, while the right eye presents vascular loops running from the central retinal vessels forward into the vitreous, which are represented in the accompanying wood-cut. Immediately in front of the lower nasal portion of the optic disk, hiding it, is a whitish gray mass which projects forward and upward. At its base are congeries of minute vessels as small as the smallest visible on the disk. Some of these form a fringe projecting downward, and from it a thin loop of vessels runs still further down, forward into the vitreous. The summit of this loop is visible with $+\frac{1}{14}$, while the disk is emmetropic. The main white stem is at its base about one-and-a-half times as thick as the largest branch of the central retinal vein at its exit from the disk. It runs upward in an S-like curve, the lower half of which corresponds nearly with the curve of the scleral ring, and from it, just below the median horizontal line of the disk, gives off a loop of small vessels toward the nasal side; and then continuing upward, curves in the opposite direction, and ends with its point extending to the nasal side. Its summit is visible with $+\frac{1}{10}$, and from it four fine blood-vessel loops project upward and forward, and two of these again



Right eye. Vitreous new growth.

The most anterior summits of the loops are seen with

ient was treated with laxatives, potassium iodide, and with frictions. The medication, however, appeared to have no ond diminishing the headache and slightly clearing up the f the left eye, so that in February, 1878, the patient could ers with it at twenty feet.

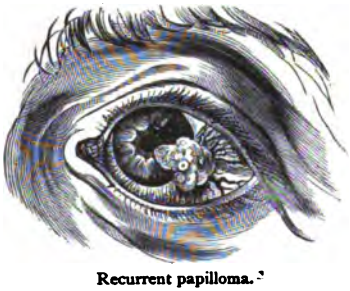
h, 1878, she was again seized with severe headache, and be- izzy in the street that she was afraid of being thought in- and was obliged to try and steady herself by a shop win- er pretence of examining the articles in it. In October, complained of shooting frontal pain, and whilst coming rs had an attack of syncope. When at the hospital her 80 and feeble, rising to 88 on slight exertion, and there ac palpitation but no valvular disease.

ruary, 1879, the patient again applied at the hospital, and relieved by purgatives and potassium iodide. The tops of s protruded a little further into the vitreous, and there was op starting from the upper inner branch. The extreme the upper loop was now visible with + 7 D; the top of the s with + 3.50 D, while the loops to the nasal side were seen ith + 3 D.

odcut represents the growth as seen in February, 1878.

CURRENT PAPILLOMA OF THE CORNEO-SCLERAL JUNCTION.

., æt. 56, a farmer by occupation, of sallow complexion, ently in good health, came to me on account of a vascular r-like growth at the junc- outer and lower segment t cornea with the sclero- e accompanying woodcut exact size and position owth. The extreme tip umor was not attached rnea, but the body of it y adherent to its super- rs—quite as much so as linarily be the head of a pterygium in a similar position. d observed it for several months, and it was recently grow- y.



Recurrent papilloma.

seized with the forceps, and carefully dissected from its at-

tachments with a Beer's-knife, and after the slight bleeding had ceased, the surface and edges of the wound were lightly cauterized with nitrate of silver. The patient went home in a few days, but states that the tumor commenced to return in about a month, and five months afterward he came back with a recurrent growth of nearly the same size as that previously removed, and occupying the same position. It was again carefully dissected off from its attachments, and the wound cauterized with a minute quantity of nitric acid. A small sharpened stick of wood having been dipped into the reagent, wiped against the neck of the bottle in withdrawing it, and the small quantity then adhering to the wood was sufficient to cauterize intensely, but not deeply, the parts with which it was brought in contact, and the entire surface and edges of the wound were thus carefully cauterized.

The wound healed rapidly with a scarcely perceptible scar, and eighteen months subsequently he wrote me that there had been no recurrence.

The growth was hardened in picric acid, and sections of it showed, under the microscope, numerous vascular loops covered with epithelium, which was cylindrical in form next the vessels, and flattened and scale-like in its outer layers.

For the picture from which the woodcut was taken I am indebted to my friend, Dr. H. P. Quincy, of Boston, Mass. It represents the growth as it appeared before the second operation.

OF INFERIOR OBLIQUE MUSCLE. By HENRY D. NOYES, M.D., New York.

ptoms of impairment of the inferior oblique muscle have iently described; but the occurrence is rare, and a case ded unusually good opportunity for being studied may asons be considered worthy to be reported. I, of course, resis of this muscle exclusively, without any complica- ocular muscles. Alfred Graefe (see Graefe and Saemisch, te Hälfte, p. 45) reports, among 250 cases of muscular , that the inferior oblique was itself alone affected in only es.

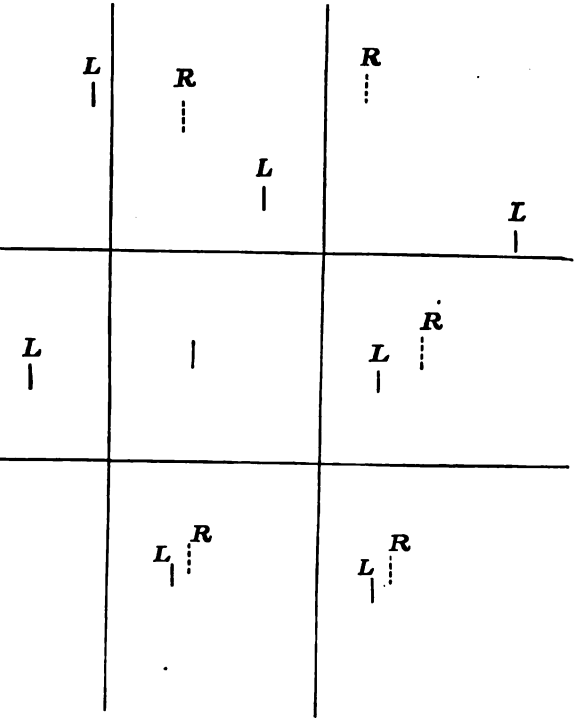
th of September, 1876, the writer was violently thrown ; was for a few minutes unconscious, had bleeding from the ceived a laceration of semilunar form about one and one- es long, running from the body of the right malar bone within one-fourth of an inch of and curving around the us. There was emphysema of the lower part of the t was not impaired. The injury was upon the right side During the evening and about four hours after the elling came on and the wound was closed by a suture. son very kindly did what was surgically needful. While in a room lighted by a gas-light, which shone through oor, a well-defined scotoma was projected against the ls. It had a deep crimson hue and occupied an angle 7° to 10°. It belonged to the right eye, and was at the e field. All objects could be seen through it, even fine s phenomenon continued for several days. Swelling took nly in the lids, but in the orbit, causing slight exophthal- me serous chemosis. The next morning double vision ed to be present in all parts of the field. On the fifth lling and exophthalmus had much abated, and the true the accident could be discovered. There was a little of the cheek; clots of blood were expelled from the nares; there was slight crepitus of the malar bone and mobility. There was a sharp notch at the place of

junction between the superior maxilla and the malar bone, and another more shallow depression at the union of the ascending process of the malar with the temporal extremity of the frontal. There was a deep notch at the middle of the inferior orbital edge, and another one at the middle of the outer orbital edge. The act of chewing gave great pain when the right upper canine and its neighbors were put to use. The pain darted with great intensity along the track of the infra-orbital nerve. There was, moreover, a region of numbness covering the most of the ala nasi, and a space beneath the inferior tarsal border equal to the length of the lid and for an inch below. From all these symptoms it was plain that the malar bone had been forced backward and outward so as to be loosened from its attachments to the neighboring bones, and that a line of fracture had gone through the infra-orbital foramen and the place of origin of the inferior oblique muscle. The writer was attending to his affairs on the seventh day, and as the exophthalmus disappeared the diplopia was restricted to a region above the horizon, and did not at all interfere with ordinary vision. For a month after the injury, phosphenes would frequently occur before the right eye. They were chiefly on the temporal side; they were bright yellow and resembled the flame of a torch; they would appear on passing into a dark place, on holding the breath as in singing, on stooping, or upon any sudden movements. They invariably had a bright golden yellow color, without fading into other tints, and their duration was only for an instant. They had a bewildering effect and were disagreeable. On October 4th, Dr. Callan kindly examined the fundus of the eye and found nothing abnormal. There was absolutely no fatigue in using the eyes. By the 22d of January, 1877, the teeth of the upper jaw had recovered sensibility, but numbness of the skin in the space described continued for eighteen months. It may be assumed that this period was necessary for perfect restoration of continuity in the lacerated fibres of the infra-orbital nerve.

The double vision was from the first a subject of curious and attentive study. Five days after the injury the scheme of diplopia, as tested by a red glass and candle flame, gave for the point of direct fixation in front, single vision. At 26° above the horizon two flames appeared, and at the extreme attainable height of the line of vision the images were crossed and of different height, the false image being above, *i. e.*, the right. Along this upper range the vertical separation increased to the right and disappeared to the left, while at the extreme left the false image went a little below the

is same range the lateral separation increased to the ss to the left for a space a little past the medium line, in grew wider. Inclination of images was not noted in ion. Along the middle range there was single vision, ve for the centre; to the right there was homonymous the false image above; to the left there was crossed the false image remained above. On the range below

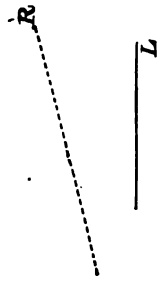
Fig. 1.



ere was on the median line diplopia, with images almost ther; the right eye image being below, to the right mage went above and to the right of the left, and it relations on the opposite side of the lower range. perimeter, the region of single vision extended on the vertically upward 26°, downward 40°, to the right on s far as the nose would allow, viz., 45°; to the left on nly to 32°. The oblique meridians were not investi-

gated. Naturally the finding of the perimeter would not accurately correspond to the region of double vision elicited by the red glass and candle. The motive for fusion of images is always less energetic when a red glass covers one eye.

On September 30, 1876, the following diagram was made. The object was a picture-frame hanging on the wall directly in front, and the angle of fixation was about 35° above the horizon. The distortion of both the vertical and horizontal meridians is very clearly displayed.



Another feature of the diplopia was discovered by carrying a horizontal rod along the upper

Fig. 2.

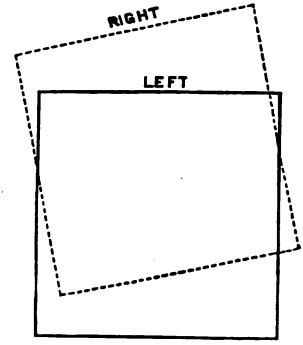
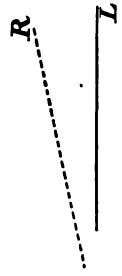


Fig. 3.



range from right to left. The two images took the subjoined relations.

The excursion was to the extreme limit on both sides, and so far that the right and left eyes were in turn unable to view the whole length of the rod. The facts displayed are that the angle of obliquity and the vertical separation increase on the right, while to the left the false image actually goes below the true and tends to become homonymous. By putting together Figures 2 and 3 it clearly appears how the vertical meridian is made to lean to the median line, and the diminution of its inclination toward the extreme left is to be construed as being in truth a great departure from the correct position, because on that side of the field the vertical meridian has an in-

the opposite kind, viz., from right downward to the

vior of the vertical meridians on the horizontal range is
that on the right side, when near to an angle of 45°, they
cal and parallel while the images are homonymous, the
e going
t on the
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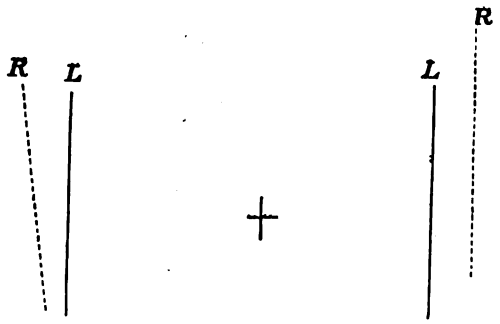
Fig. 4.



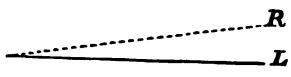
abductor, and to the opposite side it on the contrary
adductor; by this I mean, of course, in its relations to
ne of the fellow eye.

e object was below the horizon there was still a vertical
nt of the images, the right being slightly above; but for all
xtreme right, centre, and extreme left, the images were
is. The amount of lateral separation was small, and
reased on the left as compared with the right side.

dings were taken within two weeks of the injury. It is
r that the muscle was then clogged with infiltrated blood
to the laceration of its fibres. Doubtless the peculiar
just noticed were due to the exclusion of some bundles
, while others were left to act in a manner not according
al line of direction, being unbalanced. At a much later
: ten months after the injury, it was found that double
l not be produced until the look was elevated 25° above
, and the diplopia increased steadily above that to the
t of elevation, which is about 45°. To attain this height
ust be forcibly strained up, and the eyebrows strongly
the present writing, twenty-two months after the injury,
of paresis remains unchanged. At the greatest elevation,
are separated in height by an angle of less than 5°, and the

angle open to the right, made by holding a rod horizontally at an elevation of 45° is very close to 8°. Of course the vertical meridian will have the same inclination inward from the perpendicular. The attempt to decide the degree of deviation from the perpendicular, by means of the after-image, as Donders suggested, did not succeed. The faint after-image always seemed, during its brief continuance, to be quite vertical. It remains true at this moment of writing that (the eyes turned upward), when a pen-holder is held vertically at arm's length in the upper right corner of the field, it forms double images, of which that seen by the right eye is to the left, is higher and inclined medially, and seems nearer; the other image appears to slope away at the top. This crossing of the images is distinct, and disappears when the object comes half way to the median line; when brought to the median line, one image is directly below, and on a line with the other—the vertical separation being about one-half that found on the extreme right. At about 20° to the left of the median line, single vision takes place. This contradicts, so far as the crossing of the images is concerned, the statement of Prof. Alfred Graefe (see Graefe and Saemisch, l. c., p. 54), who indicates that the images are homonymous. I may remark that my ocular muscles have always been exceptionally strong—that I could fuse images separated by prisms amounting to more than 50° with bases outward, and could overcome prisms of 8° with bases inward—the object being at 20 feet distance. That the right eye is hypermetropic $\frac{1}{50}$, the left hypermetropic $\frac{1}{48}$. That there never have been any symptoms of asthenopia. How to reconcile the discrepancy above noted between this case and the statement of Prof. Graefe, I shall not attempt. That the lesion in my own case befel the right inferior oblique muscle, does not seem to me to admit of a doubt; that any other muscle has been implicated, seems equally devoid of evidence. The insertion of the inferior oblique is by a broad and fan-like expansion, and perhaps the explanation of the above discrepancy between my own symptoms and the statement in Prof. Graefe's article, may be, that in my own case only the fibres of the muscle going to the outer side of its insertion were impaired, and that in this way the adductive power was impaired for the position in question.

Fig. 5.



OF THE OPTIC NERVE. By Dr. H. Knapp, of New York.

the publications of cases of optic nerve tumors have be-
merous during the last eight years that the disease ceases
dered as a rarity, I may expect that the case I beg to pre-
ot be found devoid of interest on account of some pecu-
it offers.

History.—Jac. Günther's two-year-old son, of Glenville,
brought to my office, Oct. 14, 1878. Dr. T. R. Pooley,
d me during my absence at that time, saw the child and
case-book the following note: "Four or five weeks ago
Since then parents noticed protrusion of right eye and
g. Decided exophthalmus. No limitation of mobility.
opic examination exceedingly difficult, on account of
lessness. No abnormality noticed. *Diagnosis:* Exoph-
umaticus R."

eks later I saw the child at the N. Y. Ophthalmic and
ute. The exophthalmus was considerable, and both Dr.
myself could recognize well-marked optic neuritis. The
was straight forward; mobility unchecked; no abnormal
be detected in orbit. *Diagnosis:* Tumor of the optic
ention that no bruit was heard over the eyeball or its
s, since the alleged traumatic origin suggested exoph-
an arterio-venous communication in the cavernous sinus.
sion increasing steadily, the mother was advised, in No-
78, to have the supposed optic nerve tumor removed, with
of the eyeball, if possible. She consented, but on ac-
me general illness of the boy, she brought him back only
4, 1879, when, with the kind assistance of Drs. Pooley,
thers, I performed *the operation.*

as the conjunctiva was opened on the nasal side below
rectus, the finger felt a cylindrical tumor connected
sterior end of the eyeball. By turning the eye and draw-
of the wound apart, the tumor was brought into view. It
, smooth surface, a diameter of from 8 to 10 mm. and was
hard. It was detached from its connections all around,

cut through first at the central end, close to the optic foramen, then at the peripheral end close to the sclerotic, and removed without difficulty. The conjunctival wound was united by sutures. The eyeball, the inner half of which was anæsthetic, and the muscles of which had not been touched, was replaced, but it continued protruding considerably, on account of which the lids were united over it by a strong suture.

Jan. 5.—Lids swollen. No discharge.

Jan. 6.—Suture of lids giving way.

Jan. 7.—Lower half of cornea exposed. Cornea kept moist with milk.

Jan. 8.—Almost the whole cornea exposed; more chemosis; difficult to keep the eye moist and preserve the epithelium. The protruding eyeball pushed back, lids united over it by two sutures.

Jan. 11.—Sutures cut through again. Central opacity of cornea.

Soon the whole cornea sloughed, the protruding iris was cut off, and the little patient was discharged from the hospital with a shrinking eye on January 20, 1879. During the next month some swelling was felt in the upper part of the orbit and referred to a local relapse of the tumor, the distal end of which, at the operation, was as thick as its centre, leaving no doubt that the tumor had only partially been removed. This swelling in the orbit, however, disappeared gradually. The child has grown pale, is very weak, takes no interest in anything, and though there have not been, up to this time, any marked cerebral symptoms, I do not doubt that the tumor extends into the cranial cavity and will destroy the child's life.[1]

Anatomical Condition of the Tumor.—The specimen which I pass round—and of which the accompanying figure is a sketch in natural size—measured 30 mm. in length, 7 mm. in thickness at its distal, and 15 mm. at its proximal end, representing a truncated, somewhat irregular cone, with a slight angular bend in its middle portion. It was softish, about

[1] Oct. 1, 1879. The child was brought to the Institute again last week. There was no local relapse, no abnormity at all in the orbit, except the greatly shrunken eyeball. The boy was very anæmic and emaciated; his head appeared larger. The mother stated that for some weeks she had noticed that he was losing the sight of the other (left) eye. No external abnormity, in particular no protrusion, could be discovered in this eye, but the ophthalmoscope showed the picture of choked disk well marked, making almost certain the supposition that a pseudoplasm was in the cranial cavity and had caused neuritis descendens.

istence of muscle-tissue, and surrounded by a smooth, apsule, the outer sheath of the optic nerve. The cross- f the scleral end showed the fairly normal looking optic rounded by soft fibrous tissue, filling the increased inter- pace, and adhering to both sheaths, more intimately, how- he outer than to the inner. The cut-surface of the prox- appeared uniformly lardaceous, and surrounded by the psule, the dilated and thinned outer sheath. The optic not recognizable at this end. A longitudinal section e nerve in about half of the tumor as a compact cord, of l thickness at the scleral end, but thinning in the middle d losing itself in the central third of the tumor. Near the he arrangement of the fibre bundles of the optic nerve al, but in the middle portion numerous small round cells interfascicular spaces, which more and more widened, so e beginning of the inner third the nervous fibre tracts an-like and irregularly into the substance of the pseudo-

stance consisted of several elements with a different ar- in certain portions of the tumor. In the peripheral and ds the prevailing structure was a net-work of delicate, partly rtly irregularly arranged fibres, the appearance of which was e that of the fibres within the optic nerve. Between the numerous smaller and larger corpuscles with well-defined , filled with shining granules. In the proximal third of the delicate fibres were scanter and the cellular elements pre- some places larger cells were densely crowded with but little r substance, showing the characters of sarcoma. Softer the tumor were formed by an almost uniform accumulation d corpuscles, as we find in glioma. In some places the was viscid, the clusters of smaller and larger cells were ide by an anastomosing net-work of long delicate fibres, points of which dilated into triangular spaces enclosing e matrix was homogeneous, containing some small round ies. Since these portions exhibited the structure of myx- hole specimen should be termed: A MYXOMATOUS GLIO- F THE OPTIC NERVE.

liar features of the case are:

lleged traumatic origin of the tumor.

easy removal of the growth, without dividing any muscle t sacrificing the eyeball.

3. The subsequent destruction of the eyeball by sloughing of the cornea from exposure.

4. The extension of the growth into the cranial cavity, causing, in the course of nine months, neuritis descendens.

It is not likely that the pseudoplasm originated in the cranial cavity, particularly in the optic chiasm, since then it would probably have extended into both orbits before this time. As the proximal end of the tumor was the thickest and showed the most advanced changes, it is not impossible that the fall of the child had injured the region of the right optic foramen, producing an irritation in the optic nerve which was the starting-point of the pseudoplasm.

A CASE OF SARCOMA OF THE CHOROID, REMOVED AT AN EARLY STAGE. By Dr. H. Knapp, of New York.

Last March, a man, æt. 39, came to me, stating that about four months previously he accidentally discovered that he could see nothing distinctly with his right eye. Since that time his sight had not materially changed. He never had had pain, inflammation, or any inconvenience from that eye. When I examined him I found a sector-like scotoma, which extended from the point of fixation downward and inward, occupying the greater part of the inner-lower quadrant of the visual field. The ophthalmoscopic examination at once accounted for the visual defect. A tumor of about four papillæ diameters occupied the region of the yellow spot and the adjacent part upward. It was roundish, covered with retina, and had a system of blood-vessels of its own. It was yellowish-red. Its crest showed $H\frac{1}{4}$ or $H\frac{1}{3}$, the remainder of the fundus being emmetropic and normal. The estimated elevation of the tumor was, therefore, between three and four millimetres. The diagnosis of a choroidal tumor being evident, the sector-like defect in the visual field proved that the conduction of the retinal fibres passing over the tumor was abolished.

I removed the eyeball soon afterward. The anatomical examination of the specimen, of which I have the pleasure of presenting one-half, confirmed the diagnosis in all its particulars. The tumor was a vascular sarcoma of the choroid. The retina passing over it

ıately connected with its surface. It measured six milli- its longest diameter, and was four millimetres high.

there are not many choroidal tumors on record that are an this. I have made an elaborate ophthalmoscopic draw- e fundus oculi, a perimetric determination of the visual since the case offers several interesting features, I con- ɔublishing it in detail in the *Archives of Ophthalmology*.

FFUSION CIRCLES OF AMETROPIA.

By Albert G. Heyl, M.D., of Philadelphia, Pa.

rays from a mathematical point of light pass through the apparatus of an eye, they meet again in a mathematical ɔuld this focal point lie either before or behind the retina, formed on the retina a diffusion circle. Moreover, if an ssessing magnitude occupy the place of the light point, we formed on the retina a number of diffusion circles forming image.

ıy purpose at present to ascertain something about the *circles* as they occur in the varieties of ametropia known ıetropia and myopia; to ascertain if any difference worthy ɔtain between the diffusion circles as they actually exist in which present themselves to us in the routine of practice ypical hypermetropia or myopia which may be made to he diagrammatic eye, and to draw one or two practical s from the results.

uing this plan, I shall take the diagrammatic eye, ascertain ters of the diffusion circles corresponding to certain grades ıetropia and myopia; these grades being supposed to ı alterations in the length of the axis of the eye. I shall rtain the diameters of the diffusion circles of actual eyes re characterized by the same grades of ametropia. I have e to do this by means of the measurements of certain eyes made by Professor Mauthner, and given in his work alies of Refraction.[1]

for the present, defer all reference to the methods of cal-

[1] Optische Fehler des Auges, pages 642, 644.

culation, and simply tabulate the results. The calculations were made with the supposition that the accommodation was entirely at rest, the pupil having a diameter of 4 mm. and the rays of light coming from a mathematical point situated at an infinite distance. I shall give first the hypermetropic table:

HYPERMETROPIC TABLE.

	H. $\frac{1}{40}$		H. $\frac{1}{12}$		H. $\frac{1}{6}$	
Corneal curve.....	7.829	7.77_{375}	7.829	7.622	7.829	7.480
Length of axis.....	22.528	23.39	21.849	22.37	20.903	21.26
Shortening	.295	.494	.974	1.16	1.920	1.926
Diameter of diffusion circle.....	.064	.102	.212	.244	.419	.412
	D.	M.	D.	M.	D.	M.

In this table there is reference made to three grades of hypermetropia, $\frac{1}{40}$, $\frac{1}{12}$, and $\frac{1}{6}$. Two columns are devoted to each grade, one having reference to the diagrammatic eye, marked D., the other referring to the eyes reported in Mauthner's work, having underneath it the letter M.; the names to the left show to what the figures refer; thus, in hypermetropia $\frac{1}{40}$ in the diagrammatic eye we have a cornea with a radius of curvature of 7.829 mm., a shortening of axis of .295 mm., and a diffusion circle of .064 mm. in diameter. In Mauthner's eye of the same grade of hypermetropia, the corneal curve has for its radius 7.77_{375} mm.; the shortening is .494 mm.; the diffusion circle .102 mm. in diameter. The figures representing the corneal radius and length of axis in Mauthner's eyes have been derived from his table; those representing the shortening and the diffusion circles have been calculated by me, as also the same quantities in the diagrammatic eye. Allusion should be made to an error in Mauthner's table, which is apt to mislead. The length of the axis of the eye with H. $\frac{1}{40}$ is given as 22.39 mm.; this axis is so short that the diffusion circle formed on its retinæ would be larger than that in the eye with H. $\frac{1}{12}$, given in the same table. Further, by examining Mauthner's table, it will be seen that Case No. IV. has a hypermetropia $\frac{1}{6}$; its corneal curve and its length of axis are practically the same as that of the H. $\frac{1}{40}$; so that we have the paradox of eyes of the same corneal curve and the same amount of shortening present-

different grades of hypermetropia. The error is doubtless
e printer, and has been overlooked in the proof-reading.
er number is given in my table. Let us turn now to the
tion of this table.

lowest line of figures we have given the diameters of the
circles of three different grades of hypermetropia. Let us

relative lengths of these diameters. A glance shows that
and H. $\frac{1}{12}$, Mauthner's eyes, the diameters are longer than
rresponding grades of the diagrammatic eye; while in the
reverse is the case, although the difference is not so

relations which exist between the different grades of hyper-
and the different diameters. A glass hypermetrope of $\frac{1}{8}$ in
ammatic eye is 1.94 as strong as one of $\frac{1}{12}$, and a glass
rope of $\frac{1}{12}$ is 3.4 times as strong as one of $\frac{1}{40}$. The very
tion exists between the corresponding diffusion diameters.
eter of the circle of H. $\frac{1}{12}$ D. E. is .212 mm.; it is 3.4 the
e diameter of H. $\frac{1}{40}$. This kind of relation does not exist
ner's eyes. Take the grades last mentioned, and the diffu-
eter of H. $\frac{1}{12}$, .244 mm. in length, is only 2.3 times as large
H. $\frac{1}{40}$.

, then, that in the diagrammatic eye the diameters of the
stand in fixed relation with the grade of the anomaly, pro-
ly increasing in length with the increase in grade. In
h meet us in clinical experience this is not the case; no
ule is followed. We cannot say that in Mauthner case of
t the diameter is abnormally long, nor that in H. $\frac{1}{12}$ it is
short. The true statement would seem to be that in
enting themselves to us in the routine of practice, that the
les of hypermetropia may be characterized by different
sion circles. I suppose, of course, as already stated, that
modation is at rest and the pupil of the same size.

ne who examines the subject closely will soon find that two
es may be characterized by the same grade of hyperme-
d yet vary very much as regards their corneal curves,
axes, etc. One need only consult Mauthner's tables to
I wish now briefly to illustrate the effect of these variations
usion circles. Let us notice:

tion in corneal curve. Take a corneal curve of 7.62_{285}
s and one of 7.96_{280} mm. radius. Suppose the value of

the crystalline lens to be that of the diagrammatic and the diameter of the pupillary image to be 4 mm.; for the sake of convenience, I will make the depth of the anterior chamber 3.8 mm., as I happen to have calculations in hand made with that value. If now I induce a glass hypermetropia of $\frac{1}{12}$ in each eye, the diffusion diameter of the eye with the stronger corneal curve will be .203 mm., with the weaker curve .207 mm., the difference between them being .004 mm.

2. Variations in the size of pupil. The effect of this on the diffusion circles is recognized by all. I need not therefore specially refer to it at this time.

3. Variations in the position and focal distance of the crystalline lens. Our present knowledge about the focal distance of the crystalline is too defective to enable us to calculate its influence. With regard to the position of the lens, however, a few words may be said. The distance of the anterior surface of the lens in the diagrammatic eye is estimated at 3.6 mm. Some variations from this exist in individual eyes. For the sake of illustration, take the cornea with a radius of 7.62285 mm., and combine with it the diagrammatic lens, its interior surface 3 mm. from the cornea. Let the diameter of the lenticular image of the pupil be 4 mm.; the diffusion diameter in a glass hypermetropia of $\frac{1}{12}$ in this eye will be .195 mm. Take this eye and simply move the lens .8 mm. further back, so that it is 3.8 mm. from the cornea, and the diffusion diameter will be .203 mm.

Once more, take a weaker corneal curve, one of 7.96390 mm. radius, with a lens distance of 3.8 mm. With the same refraction anomaly and the same sized pupil the diffusion diameter will be .207 mm.

From this we learn that it is possible for different diffusion circles to occur in eyes presenting the same grade of hypermetropia. The question now presents itself as to the power of such minute differences as exist between the diameters just given to produce any practical change in the sensation of sight. In answer to this, it must be remembered that the quantities given are diameters merely, and do not represent the circles themselves. To fully answer the question, we must calculate the areas of the circles and find the difference between them; this is readily done. If now we can ascertain the number of retinal cones which can be packed into this difference of areas, we shall be in a position to answer the question. I have been unable to find any account of the number

ound in a given area of the fovea centralis, but we may imate it in this way: We know that the diameter of a bout .003 mm.; we can then calculate the area of the ne, just as we would calculate the area of circle; we ind how many such areas would be contained into the of the areas of the two diffusion circles. This estimate, falls short of the truth, but we can see in this way that minute differences in the diffusion diameters produce very pression on the macula.

this I draw the conclusions—

by virtue of the constantly varying structure of the human may occur presenting the same grade of hypermetropia, ed of varying diffusion circles.

consequently, the diffusion circles of different grades of opia do not always stand in the same proportion the one r.

deductions flow from these conclusions. As, however, more properly to the subject of diffusion images of ame- all simply indicate one or two:

eason why certain patients with weak grades of hyperme- r with such pronounced symptoms of asthenopia. Cases vely large diffusion circles would feel the imperative f covering the defect by increased accommodation and of this increased accommodation with absolute rigor. It e suggested that the usefulness of weak cylinder glasses, even $\frac{1}{60}$, may find an explanation in this condition.

bearing of this on the etiology of strabismus convergens. would adduce this condition as an actual cause of strabis- mining the existence or non-existence; but supposing smus is, for any reason you please, to take place, what ts character?—shall it be monolateral or alternating? ical case, grade of refraction the same, visual acuteness both eyes, and yet in the one case you will have mono- he other alternating squint. Why is this? The varying rcles will explain it. Given in the one case equal diffu- s, and it is a matter of indifference to the patient which and which shall squint. Given again a larger diffusion ne than the other, and both reason and clinical experience he eye which possesses the greater facility for sight will be and the other the deviating organ. Let us turn now to e table.

MYOPIC TABLE.

	MYOPIA 1-20.		MYOPIA 1-12.			MYOPIA 1-10.		
Corneal curve..	7.829	8.155	7.829	7.736	7.2484	7.829	7.736	7.4807
Length of axis	23.421	25.42	23.828	24.798	23.49	24.030	25.05	24.347
Lengthening.	.598	.634	1.0025	.998	.87	1.207	1.25	1.16
Diam. of diffusion circle.	.1306	.125	.2189	.207	.192	.2638	.259	.256
	D.	M.	D.	M.	M.	D.	M.	M.

In this table mention is made of three grades of myopia, the diffusion diameters are calculated for each grade in the diagrammatic eye; in Mauthner's eyes, one eye of $\frac{1}{20}$, two of $\frac{1}{12}$, and two of $\frac{1}{10}$ are taken, and the diffusion diameters calculated. A glance at the lowest line of figures will show that the diameters in Mauthner's eye are in every case smaller than in the corresponding grade of the D. E. Examination will likewise show that while in the diagrammatic eye, the diameters stand in the same fixed relation to each other as the grades, in Mauthner's eyes variations exist. The same interest, however, does not surround the myopic and hypermetropic tables; the practical bearing of the latter is greater. I shall therefore simply call attention to one point. Mauthner,[1] in his splendid work so often already alluded to, thus refers to the relative acuteness of vision of myopes and hypermetropes: "If we make the visual acuteness depend only on the size of the diffusion circles . . . . a hypermetrope of a certain grade will have a greater visual acuteness than a myope of the same grade," provided both anomalies depend on axis change. This he proceeds to demonstrate by the diagrammatic eye, showing that the diffusion diameter in the myope would be greater than that of the hypermetrope.

Now all this is true enough of the diagrammatic eye, but it is not always so in actual practice, as a comparison of the two tables will show. In Mauthner's eye of H. $\frac{1}{12}$, the diffusion diameter is .244 mm. while on the M. $\frac{1}{12}$, in one case the diameter is .207 mm. in the other .192 mm.; *i.e.*, the acuteness of vision if depending solely on the diffusion circle would be greater in these myopes than in the hypermetrope. It should be remembered, that while the corneal

[1] Optische Fehler des Auges: Mauthner, page 152.

so much in these eyes of Mauthner, they are, neverthe-
looked upon as true cases of axial ametropia. I have
ored to unfold a few thoughts in connection with the dif-
s of ametropia; much more could be said, but time and
l; perhaps these glittering specks, chipped from their
may indicate the spot where veins of precious truth are

Mathematical Demonstration.

e now to demonstrate the methods pursued in calculating
rs of the diffusion circles, both in the diagrammatic eye,
yes measured by Mauthner. Before so doing, I wish to
positions which underlie the demonstration.

supposed the pupil to have a diameter of 4 mm. As,
s the enlarged image of the pupil, and not the pupil itself,
the base of the cone of rays converging to the focal
ust calculate its size and also its position. The magni-
is 4.1754 mm. in diameter, and is situated 3.7052 mm.
corneal vertex.

supposed the loci of the first principal points of the eyes,
e loci of the anterior surfaces of the lenses, to be the same
he Helmholtz diagrammatic eye.[2] Of course these values
rent eyes, this variation, however, cannot materially af-
clusions I have drawn.

eaking of a given grade of hypermetropia or myopia, I
permetropia or myopia which required for its correction
at grade placed 9 mm. before the cornea.

supposed the crystalline lens in the eyes recorded by
be equal in power[3] to a glass convex spherical lens of
s placed 9 mm. before the cornea; or, to put it in other
one of these eyes deprived of its lens a glass lens of
escription would enable the eye to bring rays to the same
en its lens was in place.

aining the diameter of a diffusion circle in any eye, we
liameter of the lenticular image of the pupil, its distance

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es Normalen Auges, page 141.
holtz Diagrammatic Eye: Dr. N. G. Heyl's Archives of Ophthal-
iii., p. i.
Fehler des Auges: Mauthner, page 233.

from the posterior focus of the eye and the amount of lengthening or shortening of the axis.

In the diagrammatic eye these data are readily obtained; the diameter of the apparent pupil 4.1754 has already been given; its distance from the posterior focus of the eye is found by subtracting its distance from the vertex of the cornea from axis of the diagrammatic eye, it is equal to 19.1184 mm. The degree lengthening or shortening of the axis in a given case of ametropia is easily found by the formula $l_{,}\, l_{,,} = \phi_{,} \cdot \phi_{,,}$ Let me illustrate its use. I wish to ascertain the amount of shortening which takes place in H. $\frac{1}{40}$. 40 Parisian inches is equal to 1082.8 mm.; to fulfil the requirements of this case, rays which strike the eye so convergent that they would meet 1082.8 mm. behind the first principal point of the eye, if not acted on by the refracting apparatus of the eye, when refracted, come to a focus on the retina; but the grades of refraction spoken of in the preceding discussion are determined by a *glass* of that grade placed 9 mm. from the cornea, or 10.7532 mm. from the first principal point. The point, therefore, toward which the rays converge before undergoing refraction, is 1082.8 − 10.7532 = 1072.0468 mm. from the first principal point. As $l_{,}$ is equal to the distance of the first principal point to the anterior focal point of the eye, it is equal to 1072.0468 + 15.498 = 1087.544 mm.

$1087.544\ l_{,,} = 15.498 \times 20.713 \cdot\cdot l_{,,}$ then, is equal to $.295\ l_{,}$, being a minus quantity, $l_{,,}$ would also be negative—*i. e.*, it would mean .295 mm. reckoned from the posterior focal point in a negative direction; all distances reckoned from the posterior focal point toward the cornea being negative, and all distance reckoned in the contrary direction being positive; $l_{,,}$, then, in this case, being negative, indicate .295 mm. shortening of the axis.

I have now all the data necessary for finding the diameter of the diffusion circle. I have the size of the apparent pupillary plane, its distance from the posterior focus of the eye; these form the base and altitude of one triangle. There is a similar triangle having for its base the diameter of the diffusion circle, and for its altitude the amount of shortening of the axis. As these triangles are similar, the altitude of the one will be to that of the other as their bases, or 19.1184 : .295 :: 4.1754 : .064. .064 mm. is then the diameter of the diffusion circle in the given case.

Let me now briefly explain the method pursued in finding the diameter of the diffusion circles in Mauthner's cases. Here a different method must be pursued, because each individual case has its

curvature and its own amount of shortening. The
ner's tables available for our purpose are the radius of
ture and the length of the axis. We need to find the
e posterior focus from the cornea, and then the amount
is easily found, as the length of axis is given in the

wever, the position of the posterior focus, it is necessary
ow the radius of the corneal curve, but also the focus
line lens, its position as regards the cornea, the index
of the vitreous and aqueous humor. The data regard-
line lens are not given in the table, and recourse is had
ing device to supply the deficiency. Examination of
s shows the value of the crystalline lens to be equal to
x lens of 88 mm. focus, placed 9 mm. away from the
s, then, which have such a direction that they would
nt 79 mm. behind the cornea are so refracted by the
hey meet in the posterior focus of the eye. This is
mmetropic eye, and as clinical experience shows that
he lens in ametropia differs very slightly from that in
ve may consider that if rays having a direction such as
them to meet 79 mm. behind the cornea are refracted
they will meet in the posterior focus of the eye. Let
In Mauthner's case of H. $\frac{1}{40}$; the corneal radius is
The formula which we use here reads: $\frac{n_{,}}{f_{,}}+\frac{n_{,,}}{f_{,,}}=\frac{n_{,,}-n_{,}}{r}$.
has reference to a single refracting surface, like the
ing its radius; $n_{,}$ being the refraction index of the
re the refracting surface; $n_{,,}$ that of medium behind
distance of point of light, whence the rays issue, to
surface; $f_{,,}$ is distance of the focal point from refract-
All these quantities, with the exception of $f_{,,}$, are
, viz.: $n_{,}=1$. $n_{,,}=1.3365$, $r=7.77_{316}$, $f_{,}=-79$, be-
negative distance as regards the cornea. Substituting
$-\frac{1}{79}+\frac{1.3365}{f_{,,}}=\frac{.3365}{7.77_{316}}$ $f_{,,}=23.890$ mm. 23.890 mm. is
nce of posterior focus of the eye from the cornea. The
e given in the table is 23.396; the amount of shorten-
is would be the difference, or .494 mm.
simply to ascertain the distance of the posterior focus
illary plane, and I have all the data requisite for find-
on circle as before.
epted the same position and size for the apparent

pupil as in the diagrammatic eye. The distance of the apparent pupil from the posterior focus would be 23.890—3.702, or 20.185. The proportion, then, for the diameter of the diffusion circle would be : 20.185 : 1.494 :: 4.1754 : .309.

I have thus, as briefly as possible, indicated the method pursued in finding the diameter of diffusion circles in hypermetropia. The same general plan has been pursued in the cases of myopia, varied, of course, with altered condition of the problem.

ISCHÆMIA OF THE RETINAL VESSELS OF BOTH EYES, FOLLOWING FACIAL ERYSIPELAS. By David Coggin, M.D., Salem, Mass.

In his recently published *Thérapeutique Oculaire*, De Wecker states, that "up to this time double embolism has not been met with."

As a case in which I at first thought this condition existed lately came to my notice, it may not be considered unworthy to be placed upon record.

On the 6th of last April, in consultation with Dr. G. S. Osborne, of the adjacent town of Peabody, I saw Mr. B., an American, aged 62 years, a surveyor by occupation, married, and the father of several children. His eyesight had always been excellent. His health had also been good, and there was no history of any rheumatic or cardiac trouble.

Eighteen days previously he had been taken down with facial erysipelas.

His eyelids became greatly swelled, and the skin of half the upper lids sloughed.

On the subsidence of the infiltration, so he could raise his lids, he found he was quite blind, but he was unable to say whether his sight had left him suddenly.

There had been no delirium and his temperature had not exceeded 102° F.

At the time of my visit his lids were still closed, and he could not raise them enough to allow a satisfactory view of the corneæ. The ulcers left by the sloughing were irritable and they bled easily.

ating the lids by pressing up the cartilage, the corneæ
to be so denuded of epithelium as to render futile the use
halmoscope. The pupils had been kept dilated by atro-

ion was normal, and no pain was present, nor had the pa-
lained of any. There was marked chemosis, more parti-
he left eye, where the conjunctiva protruded between the
ne caruncle, and from which blood frequently oozed.
eeks later the loss of substance in the upper lids had been
ced, and without ectropion. The patient could half open
d he could also rotate them slightly, which he had been
lo earlier. Some chemosis remained in the left eye and
ate exophthalmus.
lated, though the use of atropine had been suspended.
neæ had become sufficiently clear to allow a fair view of
by the direct method. The lenses and vitreous were

nal vessels of the right eye were empty and presented a
orated appearance. The vessels in the left eye were also
save the one passing upward, which divided into two
st beyond the disk-border and contained blood so far to-
eriphery as I was able to follow, while a second vessel,
the disk beneath and to the right of the first, became ab-
nic on reaching the papillary margin.
able to determine whether these vessels were arteries or

s were of a grayish-white color and no small disk-vessels
.
er eye was there observed the cherry spot met with in
ent embolism.
as no perception of light in either eye. Dr. Robert Wil-
ston, saw the patient subsequently and, still later, Dr.
rby.
had been no symptoms indicating cardiac or arthritic
l as the two eyes were apparently simultaneously affected,
le that this case was not one of embolism but rather of
It is likely that the ischæmia resulted from the propa-
e erysipelatous inflammation beneath the capsule to the
, upon which it exercised enough pressure to retard the
of the blood in the retinal vessels and thus occasion
or it may have been caused, again, by thrombosis due

to the extension of the inflammatory process to the vessels themselves.

Without doubt there was severe inflammation in the orbit, with serous or plastic infiltration, as was shown, I think, by the exophthalmus, chemosis, and impaired mobility of the eyes.

Now assuming that absorption had been going on we should ultimately expect to find a subsidence of these symptoms, as was the case.

The patient had received the supporting treatment that is ordinarily adopted (with the addition of iodide of potassium).

I gave an unfavorable prognosis, but suggested the tentative inhalation of the nitrate of amyl and a sclerotomy, as is recommended by De Wecker, but the patient decided to have nothing further done.

Two weeks ago, when I last saw the patient, the condition of things was practically unchanged. The eyes presented a nearly normal appearance externally, while the ophthalmoscope revealed no further changes, save that the empty vessels were less readily seen in their entire course as they had dwindled away in some places and had become indistinct, while in others they gave a glistening white reflex. In the left eye the vessels containing blood looked as they did when first seen, but there still was absolute blindness.

OF APPARENT ATROPHY OF THE OPTIC
VE, IN WHICH RECOVERY OF EYESIGHT
LOWED THE USE OF HYPODERMIC INJEC-
NS OF NITRATE OF STRYCHNIA. By DAVID
STER, M.D., of New York.

LEMAN, aged 26, American and unmarried, presented him-
e Manhattan Eye and Ear Hospital, New York, on the
pril, 1879. He was so blind that he had to be led to the
y his friends. He stated that his general health had always
; that he had never suffered from venereal disease of any
that he had never used tobacco or spirits immoderately.
and kidneys were examined, and believed to be sound.
d, however, to be the subject of a certain amount of
betude.

l that when 13 years of age he had been struck with a
near the right eye. Very soon after the blow the eye
tally blind; he had great pain in the head, with delirium,
he injury, and was confined to his bed for six weeks.
perfectly well with the left eye until two-and-a-half years
it was injured by a blow from a piece of metal. This
followed by dimness of vision, some pain in the eye, and
charge from between the lids. The vision improved after
s, but soon began again to fail, and has continued to grow
l now he has to be led about.

I saw the patient, his vision was tested by Dr. D. R. Am-
of the Assistant Surgeons, and by Dr. H. F. Stowell, the
rgeon, both of whom found that he had no perception of
right eye, and that with his left the best he could do was
ngers at twelve inches. Although no mydriatic had been
pupils were dilated about two-thirds, and he had marked
, with a great deal of nictitation.

s were examined with the ophthalmoscope by Dr. D. B.
oosa, Dr. D. R. Ambrose, Dr. H. F. Stowell, myself, and
ners, all of whom concurred in the diagnosis of very far
atrophy of both optic nerves. An unfavorable prognosis

was given, and, on the same day, Dr. Stowell gave him a hypodermic injection of one-eightieth of a grain of nitrate of strychnia.

On the following day (29th), I examined the patient and found, to my surprise, that both the nystagmus and the nictitation had disappeared, and that the vision of the left eye had risen to $\frac{20}{40}$.

The patient remained in the hospital, and received a daily hypodermic injection of nitrate of strychnia, the dose being increased daily by one-two-hundred-and-fortieth of a grain. In a week the vision of the left eye had increased to $\frac{20}{30}$, and it was noted that the visual field was normal, except that there was a slight limitation in its upper part.

On May 11th, about two weeks after his admission, the dose of strychnia had reached one-fourteenth of a grain without having produced the physiological effects of the drug, and the vision of his left eye, as tested by myself, had risen to $\frac{20}{20}$. The right eye remained sightless, and the ophthalmoscopic appearances of both eyes were the same as when first examined. The patient was discharged, and I have not heard from him since.

I think the case may be placed upon record as a unique one. The patient was not an applicant for a pension, and I could learn of no motive for malingering. Had he been a malingerer, it seems highly probable that it would have been detected, examined as he was by so many, and so carefully. Were *simulation of vision* possible in cases of blindness, I should have suspected him of *that*, judging from ophthalmoscopic appearances.

OPERATIONS AT THE INNER CANTHUS. RT OF THREE CASES. By Henry D. Noyes, New York.

call attention to a method of repairing deficiencies about ortion of the lower eyelid by sliding the whole cheek, to- the remaining portion of the shortened lid, inward and lot only is this method available for lesions of the lower pplies also to cases where the skin over the lachrymal e removed, as one of the cases to be cited will illustrate. his method as one which has not been described in the It has a wide range of applications. Its peculiar fit- e found in the case of subjects who have flabby and redundant cheeks, and in such persons it meets the indi- n in case the loss of substance has involved two-thirds of f the tarsus. A twisted flap taken from the forehead, side of the nose, or from the temple, or a sliding flap zontally inward from the temple, and perhaps met by vn horizontally across the nose, are the types of opera- commonly recommended to meet these cases. The hich relief is sought are usually epithelial growths, and the lower lid near the inner canthus perhaps more fre- any other part of the palpebral region. The objection bly belongs to every form of twisted flap is the irregu- coaptation at the pedicle and the unavoidable deformity. on to the sliding flaps with two parallel horizontal inci- the conspicuousness of the incisions. The marks left lar bone and over the nose are far more noticeable than e to have them, and they can never be entirely obliter-

operation which I propose, and which I have done a imes, the advantages are—1st, that the flap cannot the flap is adequate and in perfect coaptation; 3d, the so placed as to be inconspicuous. The last character- argument in favor of this operation which leads me to general adoption. The use of a naso-buccal flap for

certain special cases of lesion of the upper lids, which I described in the Transactions of the International Congress of Ophthalmology in 1876, led me to the adoption of the kind of operation to be described. The position of the incisions is similar, and what in the present instance I employ as a flap had to be used in the former case, to conceal the deficiency caused by lifting a pediculated flap. One of the incisions is laid perpendicularly downward in the furrow alongside of the nose as far as the ala nasi, and the other one horizontally outward across the temple toward and sometimes reaching the upper border of the insertion of the cartilage of the ear. The details of the proceeding will be given in the narrative of the cases.

CASE I.—Mrs. H. K., married, born in U. S., aged 43, seems to be in good health, is rather stout, admitted to the New York Eye and Ear Infirmary, Oct. 20, 1876. A nodule appeared at the inner angle of right lower lid eighteen years ago; it looked like a scratch which was healing. It never gave pain and never entirely healed. Within five years it has made rapid growth. It is now an ulcerated surface with nodular edges, and of an irregular lozenge shape. Its greater axis is vertical and about 30 mm. long; its width is about 15 mm. The disease involves the skin at the inner canthus and the side of the nose, and extends out along the lid for 15 mm., penetrating deeply into it.

Operation.—The ulcer was dissected out and the inner half of the lower lid was removed, including all its thickness. After this dissection, it was found that epithelial infiltration extended deeply into the orbit at the inner canthus. The diseased substance was scraped out down to the periosteum as far as it could be reached, and the actual cautery then applied. To fill the gap now presented, advantage was taken of the loose, supple, and ample integument of the cheek. From the lowest point of the wound an incision was carried downward and outward two-and-a-half inches to a point half an inch from the angle of the mouth. The finger was kept in the mouth to avoid going through the mucous membrane, and the knife was led along outside the wing of the nose and in the wrinkle which continues toward the angle of the mouth. Another incision was taken from the wound outward, parallel to the edge of the lower lid, on a line about 6 mm. below its border, and continued across the temple toward the top of the ear into the hair; its length was two-and-a-half inches. At the external canthus the fibres of the external canthal ligament were freely divided, that the remaining piece

ver lid might more easily be drawn inward. The cheek dissected up, beginning at the upper and inner corner of nd was laid down as far as the incisions would permit. done by scissors, which had also been used for the horizon-, and the cutting was done in the fatty tissue, so as to flap rather less than half an inch in thickness. The bleed-ite copious, but no vessels were tied. The dissection was upted until it was completed, and the flap was then laid he bleeding surfaces exposed to the air until hemorrhage The flap was then dragged upward and inward, and its ught to the inner canthus and made fast to the skin of the e perpendicular wound was firmly held together by pin ith interposed thread sutures. Wherever any traction pin was inserted. The piece of the lower lid was drawn as to cover two-thirds of the original length, and a small inside the inner canthus, running up on the nose where y had been applied, was left to granulate. The angle of was pulled up slightly by the operation, and the cheek what flattened. The loss of substance was fully repaired, ntour of the lids was correct.

ys after, most of the pins and threads had been removed. ntal cut healed by first intention, the vertical one by gran-No important swelling, no pain, no febrile reaction. On day patient was discharged. No ectropium, the mouth ed; wounds healed, except a small granulating surface at us.

tograph was taken, and exhibits the horizontal cut which ffaced and shows no traces of the vertical cut. In 1878 ance of the face was so natural and the cuts had so greatly it required close inspection to discover the fact of an oper-e mucous surface of the lower lid was restored, partly by ing piece and partly by the transformation which had oc-he inner corner of the flap. A pseudo-mucous membrane l which looked like normal tissue, and the only deficiency sence of eyelashes for the inner third of the lid. The mained and was not sunken, and there was no ectropium of local return of the disease.

r period of the same year, 1878, patient was attacked by he uterus, from which she died.

.—Mrs. S. M., born in United States, married, æt. 50, en-lew York Eye and Ear Infirmary Sept. 19, 1878. General

health good, family history has no taints. About twenty years ago noticed a wart-like growth on the right side of the nose near the inner canthus. This increased very slowly, but gave no annoyance, until seven years ago, when an itching in and around the papule caused some discomfort. She consulted me then and I advised its removal, but the advice of other surgeons—to let the tumor alone—was accepted and adopted. During the last year the "lump" has rapidly increased in size, and the edges of the lids in its proximity have begun to ulcerate and discharge.

Patient is in fair health, of small figure and rather thin in flesh. At the right side of the root of the nose, and involving the inner canthus, is a tumor the size of a filbert—round, hard, and rather elastic to the touch. The skin adheres to it, is thin and shows an arborescent arrangement of vessels. The inner third of the upper lid, and the inner two-thirds of the lower lid are ulcerated for some distance from the tarsal edge, and this surface produces a purulent secretion which is not fetid. The integument of the nose and lids, in the vicinity of the tumor, looks red and irritable. The eyeball and ocular conjunctiva are not affected. No glandular enlargement on the face or the neck. Vision O. D. = $\frac{20}{200}$ being reduced by an old opacity of the cornea v. O. S. = $\frac{20}{20}$.

Sept. 20.—Patient was etherized, and the ulcerated portion of the lids and the mass were removed as thoroughly as possible with scissors. Disease did not seem to extend very deeply into the orbit, lachrymal sac was not seen. Actual cautery was used to stop bleeding in the orbit next to the nose. The orbital fat was exposed in the operation. The incision was then extended from the wound straight down, beside the nose to the ala, and along the lid, parallel to its edge, in a horizontal line, straight outward and backward to the ear. The whole flap, circumscribed by these incisions, was dissected up carefully by scissors, an opening into the mouth being avoided by the introduction of one finger into the mouth, and it was carried upward and inward to be stitched to the integument at the side of the nose on a level with the lower lid. A relief cut was found necessary at the lower end of the flap, near the ala nasi, to adjust the flap exactly, without raising the angle of the mouth.

After this flap had been united by lines of suture to the conjunctiva of the lower lid, and along its horizontal and vertical edges, there remained still a gap including about one-third of the upper lid and a portion of the root of the nose to be filled up, and this was done by a flap about the size of a silver half-dollar, taken from the arm,

ethod of Mr. Wolf. The subcutaneous connective tissue
n dissected off, the flap was very ample ; and when put in
was found that the levator muscle, which had been left,
e it readily with the remaining portion of lid.
.—Warm compresses to flap, which looks white.
.—Warmth continued, flap looks well. Incisions on side
l temple healed per primam. Patient, who felt well yes-
s great nausea to-day ; controlled by hypodermic use of

.—Sutures removed to-day. Patient feels well. Flap
at nasal side, where, with strong lens, a vascularized area
" in width can be seen in the new flap, the epithelium on
der looks raised and œdematous.
.—Patient felt chilly this A.M., and nausea has returned.
°, pulse 108. Flap looks whitish and sloughy. Epithe-
s raised in vesicles and can be pealed off.
—Feels well to-day. Flap is sloughing.
—Nausea and fever again to-day. ℞. Quin. sulph., gr. ij.,

-Flap has come away completely. Nausea and fever sub-
inine has been kept up steadily as above. She now takes
hor.
—Has been gradually gaining strength. Healthy-looking
s on all raw surfaces. Patient felt chilly this morning and
elevation of temperature and redness of the cheek (flap)
ace of dissection. ℞. Tr. ferri chlor., gtt. x., q. hor. Lotio
lly.
—Patient felt better to day, was etherized this P. M., the
e wound were freshened, and a flap taken from the adja-
n of the nose was slid into the vacancy left by the slough-
transported one. To this end two parallel, horizontal in-
e carried across the root of the nose, nearly to the left
us, and the portion of integument lying between them was
slid to meet the deficiency. To facilitate this the integu-
left lid and both brows were extensively undermined, and
were carried to the brow and left lid in order to bring
and lids on a proper level. This flap, when adjusted, ac-
its object completely.
—Stitches removed to-day. Great swelling of tissues
wound, with redness and pain. Temperature 101½°, pulse
Tr. ferri chlor., gtt. x., q. 2 hor. Lotio plumbi et opii.

Oct. 15.—Lines of suture show ulceration of integumental border. Considerable discharge of sero-purulent fluid.

Oct. 20.—Compresses of lint and plaster put over flap to coapt lines.

Oct. 22.—Doing well. Compresses continued.

Nov. 1.—Wounds are all healed and edges united. Discharged to-day.

Dec. 20.—Returns to-day. Showing the flap at the inner canthus contracted so as to narrow the palpebral fissure and present an elevation at inner canthus. Cantholysis done at the outer angle for this, and a fusiform piece of the thickened flap was excised, and the edges of this incision brought together so as to flatten it. This accomplished the desired result. Discharged, *cured*, Jan. 7, 1879.

A photograph was taken on Nov. 18th, and shows the swollen flap from the root of the nose, and also how much the palpebral fissure was narrowed. The lines of the incisions along the nose and on the temple can be traced. The patient was seen again in July, 1879, and a small mass of simple granulation tissue removed from the inner canthus. The appearance of the face is extremely natural, and she has perfect command of the eyelids. Another photograph was obtained in Oct., 1879, of which the figure on the opposite page is a copy. The parts look natural, the lids open sufficiently, and there is no pain.

I add to the above cases another, which illustrates an unusual kind of deformity of the eyelids, and a proceeding which can be used when the supply of skin for transplantation is scanty.

CASE III.—W. M., aged 18, born in United States, was admitted to the New York Eye and Ear Infirmary on Nov. 7, 1878. General health good, with the exception of having had intermittent fever. Within six months he had facial erysipelas, which caused an abscess on the cheek, followed by extensive sloughing. The cicatricial contraction has produced complete ectropium of the lower lid, and has, in addition, dragged down the skin about the inner canthus, together with the upper lid, so as to completely cover the eye and render it useless. Patient is obliged to wear a bandage to protect the everted eyelid from irritation.

Operation.—Patient was etherized, and an incision made parallel to the lower lid and half an inch below its edge, dissecting up the tissues freely until the lid could be completely restored to proper position. All of the nodular cicatricial tissue was then excised. Next the inner canthus was cut loose to free the upper lid. Across

the nose the parallel incisions were carried horizontally,
thus marked out, and which was about half an inch in
freely undermined toward the upper lid of the opposite
ially under the brow, and made to meet the loosened
f the right eye, to which it was stitched fast. Both upper
e thus brought to the same level. A large gap below
id now remained to be filled. To aid in this result an in-
carried vertically down alongside of the nose to its ala,

jacent skin undermined, so as to loosen and lift up the
e space to be filled was too large, and the tissues too
ght to close the gap by sliding the cheek. It was neces-
e a flap from the temple, which was done by extending
s in a proper manner until a flap, one inch and a quarter
wo and a quarter inches long, was obtained, and when
zontally was found to fit the vacancy perfectly. To avoid
visting of the pedicle, the most external vertical cut was
ll down in front of the ear. The apex of the flap being

stitched into position at the inner canthus, it remained to cover the large lack of substance on the temple. The skin of the vicinity was too firm to permit any approximation of the edges, even after extensive undermining. A horizontal incision was made above the ear, and from its posterior extremity another cut was carried up vertically, until a sufficiently large flap of the hairy scalp had been obtained to fill the hiatus. This was slidden forward on its base, which was above, and properly secured. The line of hair was thus brought to within a quarter of an inch of the outer end of the eyebrow, and all wounds about the lids, cheek, and temple were in perfect coaptation without undue tension. A small triangular space in the scalp, just behind the tip of the ear, was left to be filled by granulation.

This compensatory flap from the scalp, to take the place of one removed from the temple, is a device to which I have had recourse on occasion during a number of years. It is applicable when a large amount of tissue has to be removed from the temple, and the adjacent parts cannot be slidden enough to cover. A granulating surface on the temple leaves a large and ugly scar, while a cicatrix on the scalp is of no consequence. The primary flap has its pedicle below, the secondary or compensatory one has its pedicle above. Both are nearly of the same form and size, although the incisions will be directed so as to secure the best adjustments. The scalp is so mobile that the vacancy to be left will become a very small triangle.

In closing up the wounds fifty-five sutures of fine black silk, and seven hare-lip (fine insect) pins were used. The operation occupied two and a half hours. Much blood was lost. Several arterial twigs were encountered and were either twisted or checked by pressure; none were tied.

Patient was distressed by nausea and great thirst all the evening. Milk and whiskey were given freely. On trying to rise during the night he fell back faint against the wall. Morphiæ sulph., gr. $\frac{1}{8}$, produced sound sleep.

Nov. 9.—Feels well. Lines of suture look well. A pressure-bandage kept upon the flaps to promote absorption of a large thrombus.

Nov. 10.—All the thread sutures taken out; pins left; pressure continued.

Nov. 14.—Last pin taken out. The lines of incision measure nineteen and a half inches in the aggregate. Since the 12th, patient has been sitting up.

Nov. 22.—Was discharged, granulating surface nearly healed.

1879.—Returned to-day. Has good use of his eye. The
pening on the same level as the other eye, but it does
to proper width, and the skin at the inner angle comes
vertical fold, like an extreme degree of epicanthus, and
he caruncle. It reaches out over one-third of the palpe-
g. This is the result of the contraction of the flaps and
the skin to deeper parts. Patient not in very good con-
had fever and ague, and looks thin. It was thought prop-
t to correct the partial closure of the lids.

as etherized. A horizontal incision was made through
of the vertical fold of skin, and it was found that the
our of the inner canthus was not disturbed. The sur-
in was undermined above and below with scissors. A
en from the root of the nose, having its free end above
n line and its base below, and the latter was loosened and
incisions running down on each side of the median line
until it had a length of one inch and a half, and its breadth
ch. The tip of the flap was split down its middle for about
, and the subcutaneous tissue trimmed off to reduce its
ts extremity. The bifurcated end was now adjusted to the
s and held in place by stitches. The gap at the fore-
la) was covered by drawing together the skin and hold-
s. A small triangular vacancy, below the inner border
lid, was filled by sliding inward a quadrangular flap
was below. This bit of skin came to grief because it
of that flap removed from the temple, and was located
ot where the original cicatrization existed. To support
e cheek was drawn toward the inner canthus by means
ture, whose extremities were one inch and a half from
One was on the cheek, the other on the nose near the
he opposite eye. The thread was carried beneath the
laps. All the parts were accurately fitted without ten-
the above-described quill suture and by numerous fine
utures. (See diagram.)

—The lines of junction on the forehead and at inner
ed by first intention. The flap turned in from the cheek,
as held *in situ* by the quill suture, has mostly sloughed,
ions are springing up. Discharged.

—Came to the infirmary to-day. Is able to open the eye
slight ectropium of the lower lid exists, but is not annoy-
he appearance of the parts is satisfactory.

A DESCRIPTION OF A MODIFICATION OF FÖRSTER'S PERIMETER.

By Dr. W. H. Carmalt, of New Haven, Connecticut.

The apparatus to which I beg leave to call the attention of the Society is simply a modification of Förster's well-known perimeter, rendered accessible to American practitioners, and freed from certain accessories which both increase the cost of that instrument and complicate its working, but which can, I think, be so changed or entirely done away with as not to lessen its value.

It is represented in a front view by Fig. 1, and consists, in the main, of a brass arc, B, revolving smoothly around an axis, c, the latter sliding up and down on the rod, A.

The arc is cast accurately on a uniform curve of 35.5 centimetres radius; it embraces in its length about 140° of a circle, and is in two parts. The main central portion includes about 100°, the axis, c, being at the middle of this; the additional piece, to make up the remaining 40°, is arranged to fit to either end of the main part, making whichever arm it is attached to 90° from the axis. The arc is about 65 millimetres broad, and of sufficient thickness to be firm and preserve its curve; being cast is an additional security to the same end. The face is blackened, and a white line drawn through the middle along its whole length. It is also divided by similar white lines, at right angles to this line, into spaces of 10°, each numbered respectively up to 50°, on the main piece of the arc, and continued on to 90° on the additional piece.

The axis, c, extends backward about 70 mm., and near the farther end has a hole through which the rod, A, passes perpendicularly. A thumb screw at the extreme end serves to fasten the axis, and with it the arc at any height upon the rod. This rod is of highly polished steel, nickel-plated, 9 mm. in diameter and 48 cm. in length; it is screwed firmly at its lower end into the heavy brass clamp, E, which may be fastened to the edge of a table, mantel-shelf, bracket, or other convenient support, by means of a heavy thumb-screw, with a revolving washer at the top, allowing a firm grasp without tearing or fraying the underside of whatever woodwork it may be attached to.

ıe front of the clamp E, by a half bayonet fastening, so be unshipped and laid aside when not in use, is attached , carrying at its other end the crutch-piece, C, intended to e chin of the patient. The arm proper is about 30 cm. uare tubing, and receives into its open end another slid- allowing the whole to be lengthened to 35.5 cm., men- the radius of the arc B, and the proper distance for the from the point of fixation, C. Another piece of square

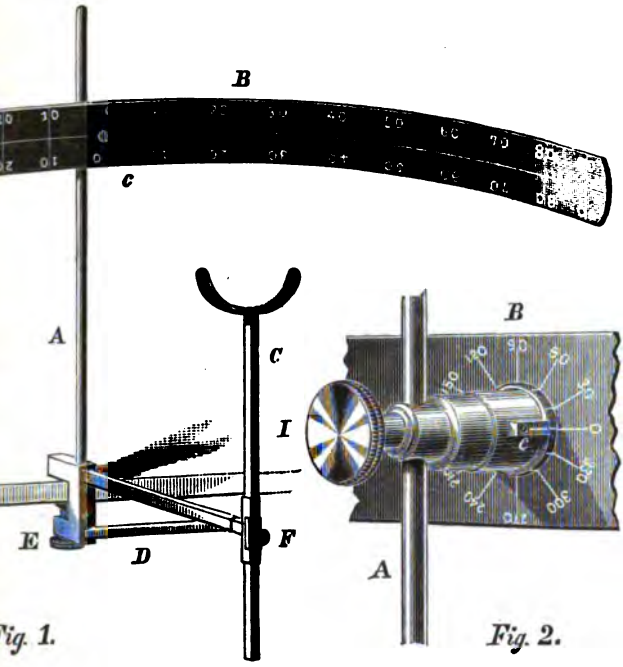


Fig. 1.

Fig. 2.

stened at right angles and perpendicularly to this piece, ides the square nickel-plated rod, C, carrying upon its a curved piece of smooth nickel-plated brass, upon which sts. This rod may be fastened at any height upon the a small thumb-screw, F, so that the height of the crutch B may be made to correspond respectively to the heights and the eye of the patient.

ows the reverse side of the arc B, the prolongation of the ard, the rod, A, upon which it slides, and the thumb- ning. On the left-hand side of the axis as the patient

sits facing it, directly on the horizontal line, is an index, c, pointing to radiating lines on the reverse surface of the arc. These radii are drawn around the axis in spaces of 30°, numbered as the opticians now reckon, the axes of cylindrical lenses (as the Society has this year given its approval) at zero for the left horizontal line, and running upward and around to 360°.

It would be quite out of place here to urge the importance of accurately recording the visual field when possible; in order to facilitate this, I have persuaded the maker of the perimeter to publish a chart to send with it. This chart is on a somewhat larger scale than any heretofore published, the scale being exactly *one* millimetre for each degree of the circle comprising the diagrammatic visual field. The centre of the field corresponds to the macula lutea, the chart is then spaced off—1st, by concentric circles, each 10° or 10 mm. apart (and the actual distance from the macula of a defect or lesion in the eye when it gives a break in the field of vision may, in some cases, be calculated); and 2d, by radii drawn at every 30° of the visual circle, intersecting the above concentric circles and numbered to correspond with the radii on the reverse side of the arc. The blind spot is noted at about 15° external to the centre of the chart. The clear space on the chart is an approximation only to the normal visual field; the variations at the periphery being so dependent upon individual conformations of face, prominence of eye, etc., that a standard scheme would, of course, be useless. This has been constructed as an average, from the observations of Förster, Aubert, Schoen, Hirschberg, etc., and it was thought desirable to indicate nearly the usual field, so that a striking variation would be detected at a glance. I have had it printed upon thin paper, for insertion in the book of histories which every one keeps.

The object of fixation (as stated, the proximal extremity of the axis) is an unpolished disk of nickel-plated brass, 15 mm. in diameter. I use, for the second or movable object, squares of thick cardboard, capable of being inserted in a little spring clasp at the end of a stick serving as a handle. This handle is 35.5 cm. long, and may be used to determine with sufficient accuracy the position of the patient's head, or rather eye, at the centre of the curve of the arc, by measuring the length of the handle from two points (say zero and 90°) on the arc; where these intersect on the horizontal plane is the centre of the circle, and there the eye should be placed. The chin then resting upon the crutch is steady enough for practical purposes.

The instrument as described is made by Mr. Paul Roessler, an

New Haven, price $20. A number of little card-board s" respectively 10 and 5 mm. square, each in white, e, red, and green, go with it. He also furnishes the above-charts at $3 per hundred.

ICS OF EXTRACTIONS OF CATARACT BY THE OPERATION AND BY v. GRAEFE'S METHOD.

ENRY D. NOYES, M.D., New York.

lowing tables have been prepared, not with the view of instituting a comparison between the old flap operation odern v. Graefe's method, but with the view of attempting a just estimate of each by itself. As to the flap extrac- e discovered some errors in the table collated by Dantone, zur Extraction des grauen Staars," Erlangen, 1869, in Certain cases by Sichel having been omitted, and the edited to Roux not being correct, I therefore thought best he table, giving the authorities, that it might serve for ence.

g v. Graefe's method, no effort has been made to separate erable subdivisions of this operation from each other; e wound be at a greater or less distance from the limbus, or less of a flap. It is not asserted that these differences ave influence, or that some other details may not be ut the purpose has been to gather into a mass all the ases, that the aggregate may be large enough to justify ral deduction as to the value of the operation in its per- failures. It is not claimed that 11,000 cases are enough a precise numerical statement of percentage, but it is all n now command, and the figures may be utilized in future. t the tables without, at the present time, attempting to deductions or comments.

TABLE OF FLAP EXTRACTIONS.

OPERATOR.	CASES.	LOSS.	REFERENCES.
		Per cent.	
Daviel	207	11.70	J. C. Hellmann: Der Graue Staar und dessen Herausnehme. Magdeburg, 1777.
Daviel	34	26.40	
La Faye	6	33.30	Mackenzie: Treatise on the Eye. Am. Edition, 1855, p. 710.
Poyet	7	28.40	
Sharp	19	50.00	
Tartera	33	24.20	
Roux	306	38.56	
Hellman	50	16.00	
Jung	237	14.30	J. H. Jung: Methode der Grauen Staar Auszuziehen. Marburg, 1792.
Richter	10	30.00	Himly.
Rosas	42	7.20	Seeliger. Wien, 1828.
Rosas	39	12.00	Schmidt Jahrbücher.
Sichel	780	11.92	Annales d'Oculistique. T. 34, p. 175.
Werner	26	12.00	Schmidt Jahrbücher.
Fred. Jaeger	728	4.50	Ed. Jaeger: Ueber Grauen Starr. Wien, 1844.
Ed. Jaeger	114	7.50	Ed. Jaeger: Ueber Staar u. St. Oper. Wien, 1854.
Arlt	1,494	7.78	Graefe und Saemisch: Handbuch, B. III., 1, 318.
Rivau-Landrau	2,073	10.00	Annales d'Oculist., T. 47, p. 65.
Pagenstecher	127	11.10	Jahresberichte, 1859, 1861, 1862.
Stöber	30	20.00	Jahresberichte, 1856 u. 1858.
Küchler	22	5.00	Deutsche Klinik.
Heymann	30	10.00	Prager Vierteljahrschrift, B. II, 1860.
Ruete	108	9.30	Programm, etc. Leipzig, 1867.
Mooren	97	11.00	Verminderte Gefahren, etc. Berlin, 1862.
Mooren	59	3.40	
Rosander	168	34.50	Zehender Monatsblätter, 1864.
Rosander	7	14.20	
Steffan	16	18.70	Jahresberichte, 1865 u. 1866.
Knapp	79	13.90	" 1864 u. 1865.
von Graefe	1,600	7.00	Archiv f. Ophth., Bd. XI., Abth. 3.
von Graefe	900	5.00	
Gioppi	194	13.90	Gioppi. Resoconto. Padova, 1858.
Quaglino	21	28.50	Giornale d'Oftal. Torino, 1868.
Magni	35	28.50	Il tempo, 1858.
Rothmund	396	12.20	Bericht, 1868.
35 items	10,094	$\frac{591.96}{35}$ = 16.91 per cent. loss.	

If in the above table we leave out all the items in which there are less than 50 operations, let us see how the result will be affected, as in the following table:

FLAP EXTRACTIONS.

OPERATOR.	CASES.	LOSS.
		Per cent.
.....	207	11.70
.....	306	38.56
.....	50	16.00
.....	237	14.30
.....	780	11.92
.....	728	4.50
.....	114	7.50
.....	1,494	7.78
au.....	2,073	10.00
.....	127	11.10
.....	108	9.30
.....	97	11.00
.....	59	3.40
.....	168	34.50
.....	79	13.90
.....	1,600	7.00
.....	900	5.00
.....	194	13.90
.....	396	12.20
.....	9,717	$\frac{243.56}{19}$ = 18.08 per cent.

fference obtained by excluding the small amounts, it will is only trifling, and accrues adversely to the general

w present a table of operations by Graefe's method :

Table of Graefe's Operations.

Operator.	Year.	Cases.	Loss in per cent.	References.
Graefe.....	1865–6	369	3.3	Archiv für Ophthal., Vol. XI. and XII.
Knapp.....	1867	100	2.	Archiv für Ophthal., Vol. XIII.
Knapp.....	1868	100	2.	" " Vol. XIV.
Meyer.....	1867	67	3.	Klinische Monatsblätter für 1867, page 279.
Höring.....	1867	77	6.4	
Heymann.....	1867	40	5.	Ophthal. Bericht, 1868.
Wecker.....	1868	50	5.	Des nouveaux procédés, etc. Paris, 1868.
Rothmund.....	1868	186	3.8	Dantone: Beiträge, etc. Erlangen, 1869.
Critchett.....	1868	100	5.	Congrès périodique d'Ophthal. Paris, 1868.
Wecker.....	1869	109	4.8	Nagel: Jahresbericht, 1872, p. 195.
Coccius.....	1869	62	6.45	" " " p. 194.
Martin.....	1869	55	3.64	" " " p. 396.
Knapp.....	1869?	100	3.	Archives of Ophth. and Otology, 1869, p. 130.
Rothmund.....	1869–70	180	1.7	Nagel: Jahresbericht, 1874, p. 398.
v. Oettingen.....	1869	91	4.	" " 1873, p. 362.
Secondi.....	1869	120	8.33	" " " "
Horner.....	1867–70	371	5.4	" " 1874, p. 189.
Quaglino.....	1868	21	28.6	Steffan: Erfahrungen, etc., 1869. p. 14.
Snellen.....	1871	209	2.5	Werthoff. Utrecht, 1871.
Derby, H.....	1871	60	5.	Nagel: Jahresbericht, 1873, p. 363.
Holmes.....	1871	46	13.	" " " "
Wilson.....	1871	100	5.	" " " p. 364.
Wecker.....	1871	95	3.15	" " 1874, p. 187.
Cohn.....	1871	29	6.9	" " " p. 186.
Engelhardt.....	1871	15	6.6	" " " "
Evers.....	1871	79	3.3	" " " "
Jany.....	1871	31	19.3	" " " "
Just.....	1871	39	5.1	" " " "
Rothmund.....	1871	99	4.	" " " "
Schmitz.....	1871	20	0.	" " " "
Stör.....	1871	17	5.9	" " " "
Sternheim.....	1871	38	8.1	" " " "
Brockman.....	1871	22	9.	" " 1873, p. 363.
Keller.....	1871	20	11.	" " " p. 364.
Schiess-Gemuseus.	1867–72	100	20.	" " 1874, p. 188.
Sichel.....	1871–72	123	2.4	" " 1875, p. 172.
Little.....	1872	200	3.5	" " " p. 168.
Gayat.....	1872	216	4.62	" " " p. 479.
Wecker.....	1872	217	3.22	Clinique Ophth.: Martin. Paris, 1873.
Barde.....	1869–72	43	6.98	Comptes rendus, 1873.
Rothmund.....	1872	153	4.	Nagel: Jahresbericht, 1875, p. 144.
Hirschberg.....	1871–72	70	2.86	Klinische Beobachtungen, 1874, p. 38.
Maconochie.....	1873	50	0.	Nagel: Jahresbericht, 1876, p. 481.
Coppez.....	1873	66	3.	" " " p. 484.

TABLE OF GRAEFE'S OPERATIONS— *Continued.*

ERATOR.	YEAR.	CASES.	LOSS IN PER CENT.	REFERENCES.
.....	1873	250	1.6	Clinique Ophth. : Masselon. Paris, 1874.
.....	1866–73	1,500	6.25	Ophthal. Mittheilungen, Berlin, 1874.
.....	1866–73	1,075	5.67	Graefe and Saemisch : Handbuch, Bd. III., Th. 1, 318.
d.....	1873	116	3.44	Nagel : Jahresbericht, 1875, pp. 150 and 156.
.....	1873	100	9.	Transactions Amer. Ophth. Soc., 1873, p. 50.
.....	1874	51	0.	Clinique, Comptes rendus. Paris, 1876, p. 105.
.....	1874	179	1.7	Clinique Ophth. : Masselon. Paris, 1875.
.....	1874	85	8.23	Trans. Amer. Ophth. Soc., 1874, p. 251.
.....	1874	15	0.	Atlanta Med. and Surg. Journal, 1874.
.....	1874	40	10.	Nagel : Jahresbericht, 1876, p. 479.
.....	1874	145	5.	" " " p. 179.
n.....	1874	81	5.	" " " "
.....	1874	74	9.	" " " "
.....	1874	49	6.	" " " "
.....	1874	43	7.	" " " "
her.....	1874	42	12.	" " " "
.....	1874	40	15.	" " " "
.....	1874	36	22.	" " " "
r.....	1874	34	9.	" " " "
g.....	1874	29	7.	" " " "
.....	1874	29	7.	" " " "
.....	1874	26	7.	" " " "
.....	1874	24	16.	" " " "
.....	1874	20	5.	" " " "
.....	1874	18	6.	" " " "
n.....	1874	15	0.	" " " "
.....	1874	13	0	" " " "
.....	1874	12	0.	" " " "
.....	1874	4	0.	" " " "
.....	1874	3	0.	" " " "
.....	1874	2	0.	" " " "
.....	1874–5	88	8.	Boston Medical and Surg. Jour., Oct. 1, 1874, Nov. 4, 1875.
.....	1874	21	14.	Report National Eye and Ear Infirmary. Dublin, 1876.
.....	1875	48	4.1	Clinique Ophthal. : Masselon. Paris, 1876.
.....	1875	372	11.	Nagel : Jahresbericht, 1877, p. 158.
emuseus.	1875	100	8.	Graefe's Archiv f. Ophth., Vol. XXI., Abth. 1, p. 153.
emuseus.	1875	100	11.	Graefe's Archiv f. Ophth., Vol. XXI., Abth. 1, p. 153.
lge.....	1875	27	0.	Nagel : Jahresbericht, 1877, p. 157.
an	1875	98	5.	" " " p. 153.
d.....	1875	93	12.	" " " "

TABLE OF GRAEFE'S OPERATIONS—*Continued.*

OPERATOR.	YEAR.	CASES.	LOSS IN PER CENT.	REFERENCES.
Secondi	1875	90	4.	Nagel: Jahresbericht, 1877, p. 153.
Just	1875	58	9.	" " " "
Rydel	1875	47	4.	" " " "
Brettauer	1875	38	5.	" " " "
Waldhauer	1875	37	27.	" " " "
Hirschberg	1875	36	6.	" " " "
Michel	1875	34	3.	" " " "
Bauerlein	1875	31	0.	" " " "
Reymond	1875	30	10.	" " " "
Derby	1875	29	7.	" " " "
Hirschman	1875	27	4.	" " " "
Schöler	1875	26	4.	" " " "
Swanzey	1875	26	12.	" " " "
Bonwetsch	1875	22	0.	" " " "
Barde	1875	19	21.	" " " "
Ponti	1875	17	18.	" " " "
v. Höring	1875	16	12.	" " " "
Schneller	1875	9	11.	" " " "
v. Becker	1875	9	0.	" " " "
Gulstad	1875	9	0.	" " " "
Hjort	1875	3	33.	" " " "
Hirschberg	1876	20	0.	Beiträge zür prak. Augenh. Leipzig, 1877.
Wecker	1876	109	0.	Clinique Ophthal.: Masselon. Paris, 1877.
Keyser	1870–77	167	4.	Trans. Med. Soc. State Penn., 1875. Separate print.
Engelhardt	1877	100	3.	Centralblatt f. Augenheil. Leipzig, 1877, p. 215.
Knapp	1877	200	14.	Paper read before N. Y. Academy of Medicine, 1877.
110 items	....	10,661	$\frac{717.84}{110} = 6.52$ per cent. loss.	

If we select out of the list the items furnished by the six operators who have done the greatest number of operations, we have a more favorable showing in the result. Instead of a loss of 6.5 per cent., we have a loss of 4.5.

The table is as follows:

LARGE SERIES OF LINEAR EXTRACTIONS.

OR.	YEAR.	CASES.	LOSS PER CENT.	LOSS PER CENT.
.....	.....	600	2.8	2.8
.....	1866 to 1873	1,500	6. to 6.5	6.26
.....	1866 to 1873	1,075	5.67	5.67
.....	1868	50	5.	
	1869	109	4.8	
	1871	95	3.15	
	1872	217	3.22	
	1873	250	1.6	
	1874	179	1.7	
	1875	48	4.1	
	1876	109	0.	3.
		1,057		
.....	1868	186	3.8	
	1869-70	180	1.7	
	1871	99	4.	
	1872	153	4.	
	1873	116	3.44	3.4
		734		
.....	1867	100	2.	
	1868	100	2.	
	1869	100	3.	
	1873	100	9.	
	1877	200	14.	6.
		600		$\frac{27.12}{6} =$
.....		5,566		4.52

e seen that among these operators the results at different re by no means uniform. Thus Wecker varies between and 5. per cent; Rothmund between 1.7 per cent. and , and Knapp between 2 per cent. and 14 per cent. Of rs Mooren furnishes the greatest number, viz., 1,500 cases, s is between 6 per cent. and 6.5 per cent.

nclusions can be drawn from series so large at the hands e operator, it seems fair to infer that any better results are expected from improvements in the method, and not vement in the skill of the operator.

we are now authorized to say, we may regard an average per cent. as what is to be expected in Graefe's mode of cataract, when done in the most skilful manner.

A CASE OF INTRA-ORBITAL TUMOR OF RAPID GROWTH, WHICH RESULTED IN DEATH.

By J. F. Noyes, M.D., Detroit, Michigan.

Early in December last, a smart, healthy-looking lad, aged seven years, the son of Mr. G——, Defiance, Ohio, while going to school, was hit by a foot-ball in his left eye. Not minding it, he continued going to school for a week, when the eye began to be painful, look red, and the parts around it to swell up. With this there was lachrymation. The case grew rapidly worse. About two weeks after the accident the father brought him to me for consultation.

Status præsens.—The lids and surroundings of the eye discolored; globe protruding and immovable; nearly all of the cornea leucomatous; the injected conjunctival sac bulging out all around the eye-ball, widely and fixedly separating the lids, and presenting a very red and glistening appearance.

The eye was enucleated Dec. 9th. Its external appearance, save the cornea, was entirely normal. A section in its horizontal meridian revealed the retina everywhere adapted to the fundus of the eye; the vitreous disorganized and fluid; the lens cataractous. Nothing further was noticed abnormal in the interior of the eye. After the eye had been removed the father would permit nothing more to be done. Having expressed to him my fears of the malignancy of the affection, in a few days he took the boy home and placed him under the judicious care of his physician, Dr. Moss. Little or no treatment was made use of, other than what was necessary to keep him comfortable while he lived. The tumefaction in the orbit increased rapidly, and, *pari passu*, the patient failed in strength and suffered very much. Death came to his relief at the end of four months from the date of the accident. The tumor then extended to a point even with the chin, and presented externally a nearly smooth, even surface. It was immediately removed and placed in alcohol. The doctor very kindly forwarded it to me for dissection and microscopical examination, and informed me that when removed its weight was one and three-quarter pounds and its "density but little greater than water." It was found that the tumor had extended into the antrum and crowded down the

e mouth, loosened up the malar bone and bridge of the pressed it over to the opposite side. No photographic permitted, either before or after death, though earnestly Numerous sections were made of the tumor by Dr. Rob- carefully examined under the microscope, and found to umerous round cells embedded in a scanty and unusually fibrous, or soft, fine, homogeneous, granular, intercellular There appeared no doubt, therefore, of the tumor being *lled* sarcoma, which always extends rapidly by peripheral in this case, infiltrating and involving the surrounding and exceedingly vascular.

N BODY IN THE POSTERIOR POLE OF LENS—ULENT CYCLITIS.

By THOMAS R. POOLEY, M.D., York.

s, æt. 28, by trade a gardener, consulted me Dec. 6, 1878. n before, while attempting to remove the hoop from a triking upon a chisel which had been inserted under it, a eel flew into the right eye. When the eye was struck he d a sensation of light flashing before it, and some pain; had been no difficulty in seeing until about ten days pre- on examination of the eye, the following notes were taken: corneal injection; S.=$\frac{10}{200}$; F. limited somewhat below; n pressure, but he says the eye aches all the while; L. $\frac{20}{200}$, A.=$\frac{1}{3}$. Oblique illumination shows a small linear- r in the cornea at its upper inner part, as well as in the psule of the lens.

n the posterior pole of the lens, to the outer somewhat t, a small foreign body of a blackish color could be dis- n; lens somewhat cataractous, the opacity extending n the rent in the anterior capsule to the foreign body; e nothing abnormal seen. In consultation with Dr. e decided to wait for the maturation of the cataract, to remove the lens, and, if possible, the foreign body with ataract progressed slowly, until the lens was so far opaque oreign body could no longer be seen; but during all this the exception of the aching already mentioned, the eye

was free from irritation or inflammatory symptoms, and not painful to the touch. On the 30th of Jan., 1879, however, he came, saying that the eye had been feeling more painful for the past few days, and that the night before the pain had become so intense that he could not sleep.

There was now circumcorneal injection, great pain, contracted pupil, anterior chamber deep, iris retracted. The eye was very tender to the slightest touch, upper inner quadrant of F. wanting. Enucleation was proposed and performed the same afternoon. There was no reaction following the operation, and the patient was discharged a few days after the operation.

The eye was opened immediately after enucleation by an equatorial section. Vitreous was clear, with the exception of about six whitish streaks, extending from the lens backward. There was an opening in the posterior lens-capsule of about half its diameter, from which the swollen lens matter was protruding, small flakes being detached and suspended in the vitreous, just as we see it often in the anterior chamber in traumatic cataract. The outer segment of the ruptured capsule forms a flap projecting backward and alongside of it; outside of the capsule lies the foreign body, a small 2 mm. long piece of steel. The foreign body was lifted up with iris-forceps, and when replaced was lying upon the outer half of lens; steel surrounded by a small abscess (from ciliary body); purulent infiltration of the vitreous, especially near the foreign body, the white streaks radiating from there backward.

In thinking over the case, it seems to me most probable that one end of the foreign body had perforated the posterior capsule, the other remaining in the lens, and so long as these relations remained, it was a harmless resident. But it finally passed through the lens and fell down on the ciliary processes, where it was found. This presumption is rendered very much more plausible by the fact that a day or two before the severe pain set in he spent the afternoon removing some barrels of apples into a cellar, and while lifting a heavy weight he may have entirely dislodged the foreign body from the lens.

But to me the most interesting and instructive lesson to be learned from the case is in regard to the treatment. In cases where the body has, as in this instance, perforated the cornea and lens, and lay in the posterior cortical substance below the nucleus, two methods may be made use of for its extraction, as recommended by Hulke and von Graefe, referred to by Knapp in his article on the Removal

ign Bodies from the Interior of the Eye: Archives, Vol. VIII.,
In Hulke's case a splinter of iron had penetrated the pe-
of the cornea and iris, and laid in the posterior cortical sub-
below the nucleus. Hulke introduced a cataract-needle
the cornea and lens behind the foreign body, and pushed
e into the anterior cortical substance. Then he made a
section, removed first the foreign body with a curette, and
cataract; recovery without irritation; vision good. In .v
case, a splinter of metal about $\frac{3}{8}'''$ in length lodged in the
r cortex, opposite the outer edge of the dilated pupil. The
had occurred about ten days previously. A small corneal
a small rupture of the lens-capsule were present. V. Graefe
he rupture with the needle. The lens swelled, the foreign body
y moved forward, and, surrounded by lens matter, projected
anterior chamber three weeks later. Lest it should fall to
om of the chamber or adhere to the iris, Graefe made a
ection, passing the knife behind the protruding lens sub-
The foreign body and the protruding portion of the cataract
t as soon as the knife was withdrawn, and the remainder of
was then expelled in the usual manner; one and a half
ter, perfect recovery. Dr. Knapp and I discussed these two
of procedure, with which he was quite familiar at the time,
s just then writing his paper; but we determined upon the
hich was pursued. It now seems to me, that, if one or the
ethods referred to by Hulke or v. Graefe had been resorted
ye might have been saved.

HYPEROSTOSIS AND PERIOSTOSIS OF THE BONES OF THE ORBIT. ILLUSTRATED BY TWO CASES. By Dr. CHARLES S. BULL, of New York.

HYPEROSTOSIS and periostosis are two distinct pathological processes in bone, though they may, and very often do, coexist. Especially is this the case in the bones of the skull and face. The one process, hyperostosis, is sufficiently rare in the region of the orbit, for, out of a total of over 16,000 cases seen by the writer, it has only been observed in two cases. The excessive development of one or more of the bones which enter into the formation of the orbit would, of course, produce the most singular changes in the shape of this cavity. Of late years we have gained a more correct idea of the nature of the processes which occur in diseased bone, and of the differences which exist between a morbid process starting from the periosteum and one originating in the bone-tissue proper. Wagner defines hyperostosis as "an increase in the diameter of the bone, occurring in the whole bone or in a part of it." It may affect only the external compact tissue, or the medullary substance alone, or may be met with in both at the same time.

These processes are not uncommon in the bones of the skull, and, according to Nélaton, they occur more frequently here than anywhere in the skeleton. The hyperostosis here, however, seems to involve mainly the external surface of the bones. It was formerly supposed that some inflammatory symptoms must accompany or precede this process, but we know that the thickening of bones may go on for an indefinite period after the cessation of all symptoms of inflammation. Cases have even been known to occur in which a cranial bone has continued to increase in size without any symptoms except those produced by its increase in bulk.

Macnamara makes a distinction between simple hypertrophy and hyperostosis. The former he defines as an increased development of the characteristic elements of bone-tissue, while the latter consists in an altered relation of these elements to one another. He also makes a comparison between chronic diffuse hyperostosis of bone, or sclerosis, as he calls it, where the density is very much increased,

ondition of the cornea resulting from diffuse keratitis, the similarity of the anatomical arrangements of the soft parts of both tissues. This comparison is ingenious, and a just one.

lt of the change in size and shape of the bones of one wo orbits do not occupy a corresponding position, but is found to be on a higher plane than the other. This s sometimes very great, and yet the functions of the eye erfered with. This is especially noticeable in the first of ses here given, which is an excellent example of pure, natory hyperostosis, with absolutely no symptoms except in the orbit.

Hyperostosis of the left side of the frontal bone, the left the squamous portion of the left temporal, and possibly of enoid.

H., æt. 19; first seen Nov. 15, 1877. Patient well de- robust; no abnormality except on left side of head and trumous taint in the family, and he has never had any hilis. He has never seen well with the left eye, which he o inflammation of the eyes in infancy. The change in egan when he was nine years old, without any known has slowly and steadily increased, until now it results in deformity. This deformity consists in a very marked and enlargement of the orbital arch and frontal boss of bone, of the external angle of the orbit, of the lower orbi- extending down upon the malar bone, and along the arch, and of the hollow formed by the squamous portion oral bone. The entire orbit is pushed downward and a l toward the median line; the eye is crowded over toward all of the orbit, and the cornea looks downward and in- passing the finger into the orbit, the outer wall is found ened at the expense of the cavity, causing a suspicion enoid is involved in the process. The difference in level orbits is so marked that the superior orbital margin of the on the same plane with the inferior margin of the right ere is a trifling degree of exophthalmus of the left eye, but ents of the eye are normal in every respect, and there is , and never has been any. This thickening has been of rceptible growth; there is no history of any injury, and never been any inflammatory symptoms. Periostitis and

its consequences are therefore excluded, and we may, hence, settle upon hyperostosis of the bones involved, of the general diffuse character, as the diagnosis. The most marked hyperostosis was in the frontal bone, which bulged forward and laterally like a dome, in the latter direction quite overhanging the zygomatic fossa. It gave the sensation of something extremely dense and compact, but both external surface and interior of the orbit were smooth, as far as the finger could judge. R. E., V.= $\frac{20}{30}$; L. E., V.= $\frac{20}{40}$; myopia, $\frac{1}{20}$ in each eye. Fundus of the left eye perfectly normal; small corneal macula just below the centre.

Hence, we may regard this case as pure hyperostosis or hypertrophy of bone-tissue, the periosteum in all probability not being involved. These cases are rare. Demarquay cites four cases of hyperostosis of bones of the skull, in which those forming the orbit were more or less involved; but in all there was a known cause, and in some the periosteum was thickened. Galezowski's explanation of these cases of pure hypertrophy, is that there is a feeble irritation which persists in the bone and is the quiet cause of the increase. Macnamara speaks of perverted nerve-action influencing the nutritive changes going on in the part, and thus inducing the abnormal growth in some cases, but admits that in instances of this kind the abnormal growth is confined to the periosteum.

Instances of periostosis joined to hyperostosis, as a result of chronic periostitis from injury, are more common than those of pure hyperostosis, and to this class the second case of deformity of the orbit belongs. As we understand the process, periostosis signifies a thickening of the periosteum, which may exist alone, without any hyperostosis. The latter probably occurs in the following way: A periostitis having been produced by some injury, it may be, after a time the underlying bone becomes inflamed. If the inflammatory process in the latter be arrested before caries sets in, the consequence will probably be a hyperostosis. To this process the bones of the orbit are said to be peculiarly liable. The result is well exemplified in the case now to be cited.

CASE II.—*Periostosis of the orbital portions of the frontal, malar and superior maxillary bones from traumatic periostitis, with probably some hyperostosis.*

Jean B. P., æt. 32, first seen April 25, 1878. Patient has had strabismus convergens of right eye since early childhood. No struma or rheumatism discoverable in the family. Patient has never

lis or any venereal disease of any kind. Four years ago the ceived a severe blow on the left orbit and left side of the h bruised and lacerated the skin and muscles, but it was uced no fracture. Since then there has evidently been a s chronic periosteal inflammation, with occasional acute ions, brought on generally by exposure to cold. The peri- ended all around the orbit, involving the frontal, malar, and naxillary bones, and has lately extended to the left nasal ne line of the nose deviates to the right side. The whole is displaced toward the right side and somewhat down- the displacement is mainly forward. There is some ex- s, though not to any great degree, but the plane of the f the left orbit is nearly half an inch in advance of that of rbit. The orbital margins are enormously thickened, par- he lower, and at present very tender, owing to an acute This thickening extends for some distance into the orbit, vs its capacity so that the movements of the eye are some- ed, though not enough apparently to occasion any diplopia. ening is so marked at the inner angle where the nasal bone in the process, that a suspicion of hyperostosis, as well as , is strongly excited. Whether the actual antero-posterior f the orbit is shortened, and whether the periostosis has o the sphenoid and ethmoid bones, it is impossible to say. nse the deformity is as great as in the first case, though ot so much displacement of the orbit downward, but the he other eye increases the apparent defect, by burying the neath the caruncle on the right side, and thus apparently e distance between the orbits, in spite of the swollen left .

se had been under treatment for a long time, but with no benefit, though the acute attacks of periostitis could easily o subside. There was no effect produced upon the chronic of the periosteum, however, by any treatment that had . Large doses of potassium iodide, repeated blistering er-irritation of various kinds, all proved valueless, and the ually withdrew from observation. Up to the last, vision good, S. $= \frac{20}{20} +$ on the affected side, and there was no dip- he fundus was found perfectly normal.

THE TREATMENT OF STRICTURES OF THE NASAL DUCT BY MEANS OF LARGE PROBES.

By SAMUEL THEOBALD, M.D., Baltimore, Ind.

My experience in the use of the large lachrymal probes, which I have recommended in the treatment of strictures of the nasal duct, has, up to the present time, been so entirely satisfactory, that I am induced to add a few words in support of what I have heretofore said in their favor, and to present to the members of the Ophthalmological Society such additional testimony regarding their usefulness, as I have been enabled to gather since my last publication upon the subject, in Vol. VI. of the Archives of Ophthalmology and Otology. This I am the more inclined to do because of the rather prevalent scepticism which I have found to exist among ophthalmic surgeons as to the practicability of employing probes of such dimensions as I have advised.

This question of practicability, whether it would be possible to use in the treatment of lachrymal obstructions, to introduce through the divided canaliculus into the sac, the very large probes which my anatomical investigations had shown were necessary to fully dilate the nasal duct, I confess, at the outset, presented itself very strongly to my own mind, and so I am but little disposed to find fault with those who, without most convincing proof upon this point, entertain a like misconception. The knowledge obtained from their use during the past two years, however, enables me to state, not only that the introduction of the large probes is, in most cases, attended with no especial difficulty, but, more than this, that it is accomplished with greater ease, and requires less skill, than the passage of the smaller ones; just as, in urethral surgery, large sounds or catheters are introduced with greater facility than small ones. The difficult stage of the treatment is, indeed, passed when we have reached No. 10 or 12 of the series which I employ.[1] The pain caused by the large probes

[1] Sixteen probes comprise this series: the smallest, No. 1, measures ¼ mm., in diameter, the largest, No. 16, 4 mm. The difference between each succeeding number is ¼ mm., so that, by dividing the number of the probe by four, we have the diameter expressed in millimetres.

is not especially severe, nor have I seen any ill consequences result from the great distention of the divided canaliculus which is produced by their entrance into the sac.

Although the cases of stricture in which I have been able to properly carry out the thorough dilatation treatment have not been as numerous as I could wish, they nevertheless afford, I think, indubitable evidence in support of the claim which I have made as to the superiority of this over the confessedly unsatisfactory methods heretofore generally practised.

In the summer of 1877, I used for the first time a probe having a diameter of 4 mm., No. 16 of my series. Since then I have had under operative treatment twenty-four strictured ducts, in twelve of which I have used No. 16. Of the other twelve cases, in which No. 16 was not used, five, who were dispensary patients, discontinued their visits after one or two probings, and were subsequently lost sight of; two were from distant parts of the State, and were unable to remain under treatment except for a few days; one was a man, thirty years of age, who had lost the bones of his nose from syphilitic ulceration, and suffered with a chronic purulent inflammation of the lachrymal sac, and who, though he derived no benefit from the use of probes, wore for many months, with much comfort, and I believe still continues to wear, a leaden style, the size of No. 7 probe, which I inserted in July, 1877; another was a little girl, eleven years of age, recovering from an acute inflammation of the sac, who permitted me, under chloroform, to slit the canaliculus, and pass a No. 5 through the duct, but, relieved of her acute symptoms, would not submit to further operative treatment; another was a married woman, thirty-eight years of age, with stricture of the left duct of seven months' duration, associated with ozœna, who ceased her attendance after No. 12 had been used, and derived but temporary benefit from the treatment; another was a man, about forty years old, with stricture of the left duct, complicated with an acute inflammation of the sac, who, being relieved of this, and of the stillicidium which had annoyed him for some months, discontinued his visits, contrary to my advice, after No. 13 had been introduced, and who, I have recently ascertained, has still a slight blenorrhœa of the sac, although he tells me the overflow of tears has not returned; and, finally, the last of the twelve was a little fellow, four months old, with stricture of the left duct manifesting itself within a few days after birth by the appearance of stillicidium and blenorrhœa of the sac, in which case, although no benefit resulted from the use of a collyrium of sulphate of zinc, sup-

plemented by the division of the lower canaliculus, the passage but once of a No. 6 probe, facilitated by the administration of a few whiffs of chloroform, was followed by the complete disappearance of all symptoms of lachrymal obstruction. This patient is still under observation, the operation having been performed upon the 2d of the present month (July). On the 21st the eye remained quite well. In two, perhaps three, of these cases—the man with syphilitic destruction of the nasal bones, the little patient last mentioned, and the woman with stricture of the left duct associated with ozœna—the very large probes could not have been introduced; but in the others probably the largest might have been used, and very different results obtained, had they remained sufficiently long under treatment.

In the twelve cases in which No. 16 was used, the treatment I have recommended—the prolonged use of very large probes, with the frequent application of an astringent collyrium—may be said to have been fairly tested, except, perhaps, in one instance, and so I have thought it worth while to append a brief description of each.

CASE I.—Mrs. H., æt. 66, German. Stricture of right duct, of twenty years' duration, associated with ozœna of many years' standing. Under treatment from April 20th till July 6th, 1877; No. 16 passed frequently, with only temporary relief, stillicidium returning within two months after use of probes was discontinued.

CASE II.—Same patient. Stricture of left duct, said to be of only a few months' duration. Treatment same as just described, and result similar.

CASE III.—Mrs. D., about 40 years of age, German, housewife. Stricture of right duct, with stillicidium of eight months' duration, and more recent blenorrhœa of sac. Treatment begun June 15, 1877. Probes introduced every third or fourth day till July 27th, when No. 16 was first used. The intervals were then gradually increased, so that between this date and Feb. 14, 1878, when the case was dismissed as cured, the canal was probed but nine times, No. 16 being used upon each occasion. A collyrium of sulphate of zinc and alum, one grain of the former and two of the latter to the ounce, was used in connection with the probing. This patient was seen in April last, fourteen months after operative treatment had been discontinued. The eye was then in a normal condition, the sac healthy, and the perviousness of the duct shown by the entire absence of stillicidium.

CASE IV.—J. L., æt. 28, American, driver of an ice-wagon.

Stricture of left duct, with stillicidium of eighteen months' duration, and present blenorrhœa of sac. Use of probes begun Jan. 22, 1877. Treatment discontinued May 10, 1878, when No. 16, which had been passed only at long intervals for some months previously, was introduced for the last time. The blenorrhœa of the sac in this case, as in the one last related, was very obstinate, but finally yielded to the same collyrium of zinc and alum. In May of the present year, twelve months after the treatment had been discontinued, I learned that the eye remained entirely well.

CASE V.—C. B. C., æt. 40, American, engineer. Stricture of left duct of thirteen years' duration. Had been previously treated by me with small probes, with only temporary benefit. Treatment begun June 24, 1877, with passage of No. 4. No. 16 was used first July 29th, and, having been passed eight times in all, was last introduced Oct. 28, 1877. Since then there has been no return of trouble. A short time since he proved to me the perviousness of the duct by closing his nose and blowing air freely through it.

CASE VI.—Same patient. Stricture of right duct of about same duration as that in left, with similar history of previous unsuccessful treatment by means of small probes. The tendency to recontraction having been much more persistent upon this side than upon the other, the occasional introduction of No. 16 has been continued up to the present time. When last seen, in the latter part of April, although the canal had been probed but three times during the preceding six months, it was found to be quite pervious, and No. 16 was introduced without difficulty.

CASE VII.—Mrs. S., æt. 44, German, housewife. Stricture of left duct of ten years' duration, with long-standing blenorrhœa of sac. Was under treatment from Oct. 26, 1877, till Aug. 9, 1878, No. 16 having been introduced twenty-eight times. The improvement in this case was only temporary. On the 6th of the present month I examined the eye, and learned that the stillicidium and blenorrhœa had returned. Throughout the whole treatment the strictures had exhibited an obstinate disposition to recontraction, and the ultimate result was not a surprise to me.

CASE VIII.—Florence G., æt. 7. Stricture of left duct, with blenorrhœa of sac, said to have resulted from a blow by a hard rubber ball two months previously. As the treatment of this case was interrupted by the patient being compelled to leave town after No. 16 had been introduced but a few times, and before the inflammation of the sac had disappeared, the return of the strictures, which subse-

quently took place, is what might have been expected, and so the merits of the large probes were, in this instance, not fairly put to the test. As showing, however, the possibility of using, even in so young a subject, the largest of the series, the case is one of interest. A few inhalations of a mixture of chloroform and ether quieted the patient momentarily, and rendered the introduction of the probes painless and comparatively easy of accomplishment.

CASE IX.—Mrs. M., æt. 46, wife of a well-to-do merchant. Stricture of left duct, with stillicidium of two years' duration. Treatment begun, by passing No. 5, December 13, 1877. No. 16, which was used for the first time January 26, 1878, was introduced six times between that date and May 13th following, when operative treatment was discontinued. Upon examining the eye a few days since, I found the sac in a healthy condition, and learned that she had had no return of the stillicidium.

CASE X.—Mrs. Mary S., æt. 25, seamstress. Stricture of right duct, with blenorrhœa and stillicidium of three months' duration. Treatment begun October 11, 1878, No. 16 being first introduced November 6th. Although the stillicidium and blenorrhœa have entirely disappeared, I still continue to pass No. 16 every three or four weeks, in order to guard against the possibility of recontraction. A successful issue in this case is, I think, assured.

CASE XI.—Mrs. S., æt. 24, German, seamstress. Stricture of right duct, with stillicidium of two years' duration, and recent blenorrhœa of sac. Treatment commenced March 24, 1879. No. 16 introduced but twice. The duct was probed last on May 12th when, being no longer troubled with the stillicidium, and the blenorrhœa having disappeared, she, contrary to my advice, discontinued her visits, but subsequently persevered in the use of a two-grain solution of alum which I had directed for her. On the 18th of the present month I could not discover that the early discontinuance of the probing had, in this instance, been detrimental to the result. The sac was found to be healthy, there was no stillicidium, and the perviousness of the duct was made manifest by her ability to blow air through it.

CASE XII.—B. McG., æt. 48, Irish, laborer. Stricture of right duct, with stillicidium of four months' duration and blenorrhœa of sac. This patient has been under treatment only a few weeks, since May 26th, and No. 16 has been introduced but twice. He is using a two-grain solution of alum as a collyrium, three times a day, and is

improving in a most satisfactory manner; but of course it is, as yet, too early to speak with certainty of the ultimate result.

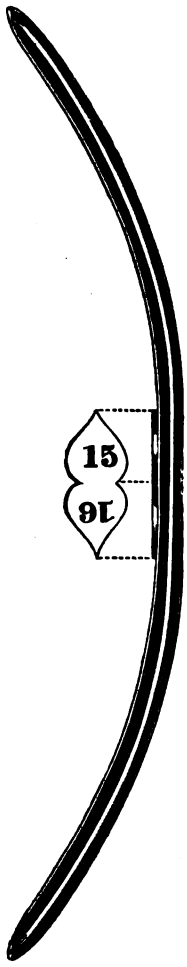
Disregarding Case VIII., in which the treatment was interrupted, we find that in three of the remaining eleven cases the use of the large probes was productive of but temporary benefit, two of these, Cases I. and II., being in the same subject, an old woman suffering with ozœna of long standing, and the other, Case VII., being a stricture of ten years' duration; in five, Cases III., IV., V., IX., and XI., a complete cure was obtained; in two, Cases VI. and X., a good result is, I think, assured, although they have not yet been dismissed as cured; and in one, Case XII., in which the treatment has been but recently begun, the improvement up to this time gives promise of a successful issue—a more favorable showing, I venture to believe, than would have been obtained in these same cases had the strictured ducts been only partially dilated by the small probes commonly used.

As to the necessity of continuing the use of the probes for so long a time, as was done in several of these cases, I am sure it is, as a rule, the safest course, although in some instances it may be superfluous. Certainly it should not be stopped so long as blenorrhœa of the sac persists, or the strictures show a disposition to recontract. In the latter case their more frequent introduction is indicated.

Unless the question of time is an important consideration, in the early stages of the treatment, I think it is best that the probes should be passed every other day. After No. 16 (or the largest which may be admissible) has been used a few times, it will not be necessary to do this more frequently than once a week; and when the inflammation of the sac has subsided, and the easy passage of the probe shows that the strictures are not prone to reform, once a fortnight, and afterward every three or four weeks, will be sufficiently often. When, in order to save time, it is necessary to do so, the probing can be repeated daily, and even at one visit a second probe may be introduced, though this is not a practice to be commended. In general, No. 5 is the most convenient size to begin with; the smaller probes may be required to dilate the entrance into the sac, and are useful in obstructions of the puncta and canaliculi. Sometimes, in ascending the scale, when we have reached a probe which seems so tight as to lead to the conviction that the limit of size has been reached, we shall, after introducing this upon several successive occasions, find that we may easily pass on to the next of the series. After dividing the canaliculus it occasionally happens that the first introduction of

the probe into the sac is very difficult of accomplishment; by being content to wait until the next day to complete this part of the operation, I have been more than once rewarded by gaining a ready entrance.

The various appliances for injecting the sac and duct, such as slender-pointed syringes, hollow probes, etc., which can be used only by the surgeon, seem to me of but little value. A simple pipette, with which the patient may thrice daily, after emptying the sac by pressure, instil into the inner corner of the eye a few drops of a two-grain solution of alum, a one-grain solution of sulphate of zinc, or of the two in combination, is, in my opinion, of far more service than they.



In order that the large probes may be used with satisfaction—indeed, I may say, used at all—it is necessary that their ends should not be too blunt, but, as I have said before, should be shaped like the smaller extremity of an olive, though somewhat more pointed. Although I have, heretofore, laid much stress upon the importance of this, and have taken no little pains, in some instances, to instruct the instrument-makers in regard to the proper form to be given to them, I have not been as successful as I could wish in having my suggestions accurately carried out. In some cases the probes have been made too blunt, or too suddenly bevelled off, so as to leave a clumsy shoulder, while in others, so absurdly sharp that to use them would have been, at least, unnecessarily painful, if not actually hazardous. When they are properly shaped, without this shoulder and with the point not too sharp, as those are which I show you, they will glide with ease into the sac, and pass without difficulty through the duct. They are made either of silver,[1] or of copper, or Ger-

[1] The larger probes, from 9 to 16, should be made of pure silver.

man silver nickel-plated. The latter are, of course, less expensive, and, because of the superior smoothness of the nickel surface, are introduced with rather more facility than the silver ones, which, however, have the advantage of being more durable, and of being easily modified as regards the shape of their points, should they not come from the maker of the desired form.

INDEX TO VOL. II.

Agnew. Cataract statistics, 118 recent cases, 251.
" Curved knife for inferior lachrymal canaliculus, 510.
" Double congenital (?) lachrymal fistula, case, 209.
" Enforced exposure to light and air, cases, 439.
" Trephining cornea to remove deeply-embedded foreign body, 204.
" and Eno. Glioma, consecutive enucleation of both eyes for, 349.
Althof, Dr. H. In memoriam, 379.
Althof. Canthoplasty, a clinical study, 232.
Ametropia, color-tests for. Green, 179.
" diffusion circles of. Heyl, 561.
" new method and instrument for measuring. Thomson, 455.
" relations of blepharitis cillaris to. Roosa, 387.
Amyloid degeneration of choroidal arteries, etc. Demonstration. Knapp, 32.
" infiltration of lid and orbit. Bull, 411.
Anæsthesia, retinal, cases of. E. Williams, 295.
" by means of nitrous oxide. Mathewson, 380.
Astigmatism, can it cause staphyloma post.? Thomson, 310.
" and myopia, remarks on association of. Green, 318.
" produced by tenotomy. H. D. Noyes, 128.
" test-diagrams for detection and measurement of. Green, 467.
Atropia dissolved in castor oil for application to the eye. Green, 355.
Atropine treatment of myopia, with table of cases. H. Derby, 139.

Basedow's disease, cases of. E. Williams, 293.
Binocular vision, stereoscopic diagrams for testing. Green, 474.
Blepharitis ciliaris, relations of, to ametropia. Roosa, 387.
Blepharospasm, elastic extension in, case. Mathewson, 207.
" hysterical, relieved by forcible elevation of lid. Strawbridge, 302.
Bone and cholesterine in eyeball, case. Strawbridge, 306.
Bowman's operation on inferior canaliculus modified. Prout, 400.
" " " " best method of performing. Prout, 405.
Bull. Circulation of optic nerve and retina in spinal disease, cases, 170.
" Hyperostosis and periostosis of the bones of the orbit, two cases, 598.
" Syphilitic gummata of the conjunctiva, 415.
" Two cases of syphilitic lesion of the eye, 195.
" Two rare diseases of the eyelids, cases, 408.

Camera lucida applied to the ophthalmoscope. H. D. Noyes, 80.
Cancerous ulceration of surface of globe, case. H. D. Noyes, 27.
Canthoplasty, a clinical study. Althof, 232.
Carmalt. A modification of Förster's perimeter, 584.
Castor oil, solution of atropia in, for application to the eye. Green, 355.
Cataract, complicated, operation of some kinds of. Knapp, 527.
" Liebreich's extraction of. Roosa, 69.
" extraction, remarks on. Green, 65.
" median flap extraction, 25 cases of. H. W. Williams, 55.
" operations (flap and Graefe), statistics of. H. D. Noyes, 587.
" " importance of accurate record of. H. Derby, 58.
" report of 114 extractions. Knapp, 50.
" statistics, 118 recent cases of. Agnew, 251.
Cholesterine and bone in eyeball, case. Strawbridge, 306.
Choroid, ossified, removed without enucleation. H. W. Williams, 406.
" traumatic rupture of. Jeffries, 79.
Ciliary body, syphilitic gumma in. Loring and Eno, 174.
Coggin. Ischæmia of retinal vessels following facial erysipelas, 570.
Color-tests for ametropia. Green, 179.
Conical cornea corrected by glasses, cases of. Thomson, 132.
Conjunctiva, sarcoma of, case of, with woodcuts. Dyer, 538.
" syphilitic gummata of. Bull, 415.
Conjunctivitis, lachrymal, and effects of retention of tears. Prout, 397.
Cornea, an instrument for tattooing the. Thomson, 86.
Critchett's operation on inferior canaliculus, modified. Prout, 401.
Cylindric lens, increase of refractive power of, when rotated about its axis. Hay, 319.
Cylindrical lens with vertical axis before one eye, effect of. Wadsworth, 342.

Dacryocystitis in nursing infants. Kipp, 537.
Delafield, Dr. Edward. Portrait and notice of, 275.
" " Obituary notice of, by Drs. Dix and Williams, 339.
Derby, H. Atropine treatment of myopia, with table of cases, 139.
" Cataract operations, scheme for recording, 58.
" Influence on refraction of four years of college life, 530.
" Sympathetic ophthalmia persisting after enucleation and exsection of end of optic nerve, 198.
Derby, R. H. Tumor of conjunctiva simulating cyst, 430.
Diffusion circles of ametropia. Heyl, 561.
Dix and Williams. Obituary notice of Dr. E. Delafield, 339.
Dixon. Sarcoma of choroid, 432. Retinitis albuminurica, 433.
Dyer. Case of sarcoma of conjunctiva, with woodcuts, 538.

Enchondroma, intra-ocular, demonstration of. Knapp, 31.
Eno. Glioma, recurring, gross and microscopical examination of both eyes, case, 350.
" Sarcoma of choroid, gross and microscopical appearances, case of, 347.
" Syphilitic gumma of ciliary body, description of, with drawing, 176.

Entropion of lower lid, Schneller's operation for, case. Prout, 249.
Enucleation followed by reduced quantity of urine in case of diabetes insip. Stevens, 506.
" in panophthalmitis. Harlan, 542.
" substitute for. H. W. Williams, 406.
Eyeball, foreign bodies in, cases. Strawbridge, 303.
Eyelid-forceps, an improved. Knapp, 107.
Eyelids, cases illustrating two rare diseases of. Bull, 408.

Fixation forceps for attaching to the speculum. H. D. Noyes, 216.
Foreign bodies, hook for removing, from interior of eye. Knapp, 107.
" " in the eyeball, cases. Strawbridge, 303.
Foreign body in posterior pole of lens, purulent cyclitis. Pooley, 595.
" " successfully extracted from retina, case. Stevens, 308.

Glioma, case of intra-ocular, latent for twenty months. Wadsworth, 11.
" recurring, case of, with consecutive enucleation of both eyes. Agnew and Eno, 349.
Graefe monument, letter concerning subscriptions for, 10.
Green. Castor oil as menstruum for dissolving atropia for the eye, 355.
" Color-tests for ametropia, 179.
" Improvements in instruments and appliances for diagnosis, 467.
" Iridotomy by von Wecker's method, 352.
" Notes of examinations of eyes after death by hanging, 354.
" Remarks on association of myopia and astigmatism, 318.
" " cataract extraction, 65.

Hanging, examination of eyes after death by. Green, 354.
Harlan. Extirpation in panophthalmitis, 542.
" Two cases of vascular disease of the orbit, 327.
Hay. Increase of refractive power of plano-cylindrical lens when rotated about its axis, 319.
" Instrument for facilitating section of optic nerve, 214.
" Refraction by a glass plate of an obliquely incident plane pencil, etc., 322.
Hemiopia, binocular temporal, case. E. Williams, 298.
Hemorrhage, intra-ocular, with amyloid degeneration; demonstration. Knapp, 32.
Herpes Zoster Ophthalmicus destroying the eye, 2 cases. Jeffries, 73.
" " " electricity in. Mathewson, 228.
" " " case. Wadsworth, 219.
" " " six cases. Jeffries, 221.
" " " loss of both eyes from. H. D. Noyes, 71.
Heyl. Diffusion circles of ametropia, 561.
Hyperostosis of the bones of the orbit, case. Bull, 599.

In Memoriam. Dr. Hermann Althof, 379.
Inferior oblique muscle, paresis of, case. H. D. Noyes, 551.
Instruments, new, 211, 214, 215.
Intra-ocular circulation—venous pulse. Wadsworth and Putnam, 435.

Iridotomy by von Wecker's method. Green, 352.
Iris, cyst of. Strawbridge, 385.
" multiple rupture of pupillary margin. Vermyne, 425.
" tumor of, demonstration of. Knapp, 31.
Ischæmia of retinal vessels following facial erysipelas. Coggin, 570.

Jeffries, B. J. Six cases of Herpes Zoster Ophthalmicus, 221.
" Two cases of Herpes Zoster destroying the eye, 73.
" White intra-ocular sarcoma, 2 cases, 24 and 26.
" Sympathetic trouble from foreign body thirteen years in eye, 203.
" Traumatic rupture of choroid, case, 79.
" Visual acuteness=$\frac{1}{6}$ to $\frac{4}{6}$, 158.
Jeffries, Dr. John. Obituary note of, 369.

Kipp. Dacryocystitis in nursing infants, 537.
" Remarks on injurious effects of recumbent position in treatment of detached retina, 290.
Knapp. An improved eyelid forceps, 107.
" A new ophthalmoscope, 109.
" Case of sarcoma of choroid removed at an early stage, 560.
" Demonstrations of pathological specimens, 31.
" Hook for removing foreign bodies from interior of eye, 107.
" Operation of some kinds of complicated cataract, 527.
" Report of 114 cataract extractions, 50.
" Tumor of the optic nerve, case, 557.

Lachrymal canaliculus, inf., curved knife for slitting. Agnew, 510.
" conjunctivitis, etc., from retention of the tears. Prout, 397.
" fistula, double, congenital (?), case. Agnew, 209.
Lens, dislocation of, cases. E. Williams, 291.
Light and air, enforced exposure to, cases. Agnew, 439.
Light-streak of the retinal vessels. Loring, 87.
Loring, E. G. Light-streak of the retinal vessels, 87.
" A new modification of the ophthalmoscope, 161, 489.
" and Eno. Syphilitic gumma in ciliary body, case of, 174.

Mathewson. A new method of treating blepharospasm, 207.
" Case of melanosis of apparent traumatic origin, 193.
" Herpes Zoster Ophthalmicus treated by electricity, 228.
" Notes on use of nitrous oxide in strabismus operations, 380.
" Remarks on detached retina, 289.
McKay and Eno. Case of general sarcoma of choroid, 345.
Meeting, 9th annual, minutes of, 7.
" 10th " " 119.
" 11th " " 281.
" 12th, 13th, and 14th annual, minutes of, 369–372.
" 15th annual, minutes of, 519.
Melanosis, case, apparent traumatic local origin. Mathewson, 193.

Murdoch. New speculum, ophthalmostat and tenotome, 211.
Myopia, atropine treatment of, with table of cases. H. Derby, 139.
" a case of extreme. H. D. Noyes, 155.

Nasal duct, strictures of, treated by large probes. Theobald, 602.
Nitrous oxide in strabismus operations, notes on. Mathewson, 380.
Norris. Cases of optic neuritis (choked disk) with colored plates, 163.
" Demonstration of water-color drawings of five rare forms of disease, 547.
" Recurrent papilloma of corneo-scleral junction, with woodcut, 549.
" Vascular new growth in the vitreous, with woodcut, 547.
Noyes, H. D. Astigmatism, caused by tenotomy of recti muscles, 128.
" A case of extreme myopia, 155.
" Case of Herpes Zoster Ophthalmicus, with loss of both eyes, 71.
" Case of cancerous ulceration of surface of globe, 27.
" A fixation forceps which attaches to the speculum, 216.
" The camera lucida applied to the ophthalmoscope, 80.
" Improvement in spectacle frames, 356.
" Paresis of inferior oblique muscle, case, 551.
" Plastic operations at inner canthus, 3 cases, 575.
" A retractor for the upper lid, 215.
" Sclerotitis of gouty or rheumatic origin, cases, 34.
" Spontaneous cure of subretinal effusion, 358.
" Statistics of cataract operations by flap extraction and Graefe's method, 587.
Noyes, J. F. Case of fatal, rapidly growing, intra-orbital tumor, 594.
" New operation for strabismus, 273.
Nystagmus, with convergent strabismus, cured by tenotomy. Pomeroy, 283.

Ophthalmoscope, camera lucida (drawing prism), applied to. H. D. Noyes, 80.
" a new. Knapp, 109.
" a new modification of the. Loring, 161, 489.
" a new modification of Loring's. Green, 476.
Ophthalmostat, new. Murdoch, 212.
Optic nerve atrophy, apparent, hypodermic strychnia, recovery. Webster, 573.
" " instrument for facilitating section of. Hay, 214.
" " and retina, circulation of, in spinal disease, cases. Bull, 170.
" " tumor of, case. Knapp, 557.
" " tumor of, removal of, leaving ball in situ. Strawbridge, 383.
Optic neuritis, cases of, with colored plates. Norris, 163.
Orbit, 2 cases of vascular disease of. Harlan, 327.
Ossified choroid removed without enucleation. H. W. Williams, 406.

Panophthalmitis, extirpation in. Harlan, 542.
Papilloma, recurrent, of corneo-scleral junction, with woodcut. Norris, 549.
Paresis of inferior oblique muscle, case. H. D. Noyes, 551.
Perimeter, Förster's, a modification of. Carmalt, 584.
Periostosis of the bones of the orbit, case. Bull, 600.
Photopsy persisting six months after enucleation. Vermyne, 449.

Plastic operations at inner canthus, 3 cases. H. D. Noyes, 575.
Pomeroy. Nystagmus, convergent strabismus, etc., cured by tenotomy, 283.
Pooley. Foreign body in posterior pole of lens, purulent cyclitis, case, 595.
" Wound of sclera treated by suture. Pooley, 43.
Prout. Lachrymal conjunctivitis, etc., from retention of tears, 397.
" Operations on inferior puncta and canaliculi, 401, 405.
" Remarks on rest as the curative agent in treatment of subretinal effusion, 423.
" Schneller's operation for entropion of lower lid, case, 249.
Pterygium externum, congenital, double. Strawbridge, 386.

Refraction of an obliquely incident plane pencil by a glass plate, etc. Hay, 322.
" under atropine, of healthy eyes which have, without atropine, normal vision ($\frac{20}{20}$). Roosa, 462.
" improved trial case for measuring the. Green, 483.
" an instrument for the diagnosis of the. Thomson, 83.
" influence on, of four years of college life. H. Derby, 530.
" new method and instrument for measuring. Thomson, 455.
Retina, case of sparkling bodies in. Stevens, 105.
" detached, spontaneous cure, case of. H. D. Noyes, 358.
" " " " case, with analysis of 21 other cases. Webster, 284.
" prolapse of, from hemorrhage after iridectomy for glaucoma. Webster, 544.
Retinal anæsthesia, cases. E. Williams, 295.
" vessels, light-streak of. Loring, 87.
Retinitis albuminurica. Dixon, 433.
" pigmentosa, ætiology of. Webster, 495.
Retractor for the upper lid. H. D. Noyes, 215.
Roosa. Examination under atropine of eyes with normal vision ($\frac{20}{20}$), 462.
" Liebreich's operation for extraction of cataract, 69.
" The relations of blepharitis ciliaris to ametropia, cases, 387.

Sarcoma, choroidal, with infection of retina, demonstration. Knapp, 31.
" of choroid, general, case of. McKay and Eno, 345.
" " Dixon, 432.
" " case of, removed at an early stage. Knapp, 560.
" intra-ocular, 2 cases of. Wadsworth, 185.
" of conjunctiva, case of, with woodcuts. Dyer, 538.
" pigmented, report of case of. Thomson, 190.
" white, intra-ocular, 2 cases. Jeffries, 24 and 26.
Schneller's operation for entropion of lower lid, case. Prout, 249.
Sclera, wound of, treated by suture. Pooley, 43.
Sclerotitis of gouty or rheumatic origin, cases. H. D. Noyes, 34.
Sparkling bodies in retina, case of. Stevens, 105.
Spectacle frames, improvement in. H. D. Noyes, 356.
Speculum, new. Murdoch, 211.

Spinal disease, circulation of optic nerve and retina in cases of. Bull, 170.
Staphyloma post., can it be induced by astigmatism? Thomson, 310.
Stereoscopic diagrams for testing binocular vision. Green, 474.
Stevens. Case of sparkling bodies in retina, 105.
" Enucleation followed by marked reduction of urine in a case of diabetes insip., 506.
" Successful extraction of foreign body from retina, case, 308.
Strabismus, new operation for. J. F. Noyes, 273.
" operations, nitrous oxide in. Mathewson, 380.
" with rigidity of the muscle, cases. E. Williams, 298.
Strawbridge. Case of cholesterine crystals and bone in atrophied eyeball, 306.
" Foreign bodies in the eyeball, cases, 303.
" Hysterical blepharospasm relieved by forcible elevation of lid, 302.
" Ophthalmic contributions, 302, 383.
" Remarks on detached retina, 289.
Strictures of nasal duct, treatment of, by large probes. Theobald, 602.
Subretinal effusion, case of spontaneous cure. H. D. Noyes, 358, and Webster, 422.
" " *rest*, the curative agent. Prout, 423.
Sudden loss of sight and hearing, some peculiar phenomena in a case of. H. W. Williams, 325.
Sympathetic ophthalmia after enucleation, exsection of N. O. H. Derby, 198.
" trouble from foreign body 13 years in eye. Jeffries, 203.
Syphilitic gumma in the ciliary body. Loring and Eno, 174.
" gummata of conjunctiva. Bull, 415.
" lesion of the eye, 2 cases of. Bull, 195.

Tarsitis syphilitica. Bull, 408.
Tattooing the cornea, an instrument for. Thomson, 86.
Tenotome, new. Murdoch, 213.
Tenotomy a cause of astigmatism. H. D. Noyes, 128.
Theobald. Treatment of strictures of nasal duct by large probes, 602.
Thomson. Brief report of case of pigmented sarcoma, 190.
" Sector-like defect of field of vision, case, 337.
" Conical cornea corrected by glasses, cases, 132.
" A new method and instrument for measuring the refraction, 455.
" An instrument for the diagnosis of the refraction, 83.
" An instrument for tattooing the cornea, 86.
" Can staphyloma post. be induced by astigmatism? 310.
Trephining cornea to remove foreign body. Agnew, 204.
Tumor of conjunctiva simulating cyst. R. H. Derby, 430.
" of the optic nerve, case. Knapp, 557.
" (sarcoma), intra-orbital, rapidly growing and fatal case of. J. F. Noyes, 594.

Venous pulse, intra-ocular circulation. Wadsworth and Putnam, 435.
Vermyne. Multiple rupture of circulus iridis minor, 425.
" Photopsy persisting six months after enucleation, 449.
Visual acuteness, $= \frac{1}{8}^{7}$ to $\frac{4}{4}^{7}_{8}$. Jeffries, 158.

Visual field, case of sector-like defect of. Thomson, 337.
Vitreous humor, connective-tissue growth in, case. Strawbridge, 304.
" " vascular new growth in, with woodcut. Norris, 547.

Wadsworth. Effect of cylindrical lens with vertical axis before one eye, 342.
" Intra-ocular glioma, latent for 20 months, etc., case, 11.
" Case of Herpes Zoster Ophthalmicus, 219.
" Two cases of intra-ocular sarcoma, 185.
" Remarks on detached retina, 287.
" and Putnam. Intra-ocular circulation, venous pulse, 435.
Webster. Apparent optic nerve atrophy, hypodermic strychnia, recovery, 573.
" Case of spontaneous cure of subretinal effusion, 422.
" Prolapse of retina after iridectomy for glaucoma, 544.
" Spontaneous cure of detached retina, case, with an analysis of 21 cases of the same disease, 284.
" The ætiology of retinitis pigmentosa, with cases, 495.
Wecker's method of iridotomy. Green, 352.
Wilkes, Dr. George, obituary notice of, 377.
Williams, E. Basedow's disease, cases, 293.
" Binocular temporal hemiopia, case, 298.
" Cases of dislocated lenses, 291.
" Remarks on detached retina, 288.
" Retinal anæsthesia, cases of, 295.
" Strabismus with rigidity of the muscle, cases, 298.
Williams, H. W. Removal of ossified choroid without enucleation, 406.
" Report of 25 cases of median flap extraction, 55.
" Some peculiar phenomena in case of sudden loss of sight and hearing, 325.
" and Dix. Obituary notice of Dr. E. Delafield, 339.

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OF THE

AMERICAN

OPHTHALMOLOGICAL SOCIETY

Sixteenth Annual Meeting.

NEWPORT, 1880.

NEW YORK:
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CONTENTS.

PAGE

MEMBERS OF THE SOCIETY..... 4

MINUTES OF THE SIXTEENTH ANNUAL MEETING..... 9

Sympathetic Inflammation following Operations for Cataract. By DR. D. WEBSTER, New York..... 19

A Contribution to the Pathology and Treatment of Vascular Tumors of the Eyelids. By DR. C. S. BULL, New York..... 32

Peculiar Anatomical Development of one of the Central Arteries of the Retina (with woodcut). By DR. F. B. LORING, Washington, D. C..... 40

A Case of Ectropion Treated Successfully by Wolfe's Method, the Transported Piece of Skin measuring 3 × 1½ inches (with woodcuts). By DR. A. MATHEWSON, Brooklyn, N. Y..... 43

The Treatment of Ectropion by Transplantation of Skin (with woodcuts). By DR. LUCIEN HOWE, Buffalo, N. Y..... 46

Intra-Ocular Lipæmia. By DR. ALBERT G. HEYL, Philadelphia, Pa..... 54

A Tabular Report of Two Hundred and Twenty-five Cases of Refraction. By DR. W. S. LITTLE, Philadelphia, Pa..... 67

Report of a Case of Traumatic Paralysis of the Superior Oblique Muscle, with Treatment. By DR. W. S. LITTLE, Philadelphia, Pa..... 76

Report of a Case of Partial Paralysis of the Inferior Oblique Muscle, with Treatment. By DR. W. S. LITTLE, Philadelphia, Pa..... 80

Cases of Laceration of the Eyelids. By DR. H. D. NOYES, New York.... 82

Glioma of Both Eyes; Removal, Recurrence, Death and Autopsy. By DR. H. D. NOYES, New York..... 87

On Keratitis from Malarial Fever. By DR. C. J. KIPP, Newark, N. J.... 91

A Case of One-Sided Complete Blindness from Ischæmia Retinæ, ending in perfect Recovery. By DR. H. KNAPP, New York..... 93

Eight Sclerotomies for Glaucoma. By DR. H. KNAPP, New York..... 95

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CONTENTS.

PAGE

MEMBERS OF THE SOCIETY..... 4

MINUTES OF THE SIXTEENTH ANNUAL MEETING..... 9

Sympathetic Inflammation following Operations for Cataract. By DR. D. WEBSTER, New York..... 19

A Contribution to the Pathology and Treatment of Vascular Tumors of the Eyelids. By DR. C. S. BULL, New York..... 32

Peculiar Anatomical Development of one of the Central Arteries of the Retina (with woodcut). By DR. F. B. LORING, Washington, D. C..... 40

A Case of Ectropion Treated Successfully by Wolfe's Method, the Transported Piece of Skin measuring 3 × 1½ inches (with woodcuts). By DR. A. MATHEWSON, Brooklyn, N. Y..... 43

The Treatment of Ectropion by Transplantation of Skin (with woodcuts). By DR. LUCIEN HOWE, Buffalo, N. Y..... 46

Intra-Ocular Lipæmia. By DR. ALBERT G. HEYL, Philadelphia, Pa..... 54

A Tabular Report of Two Hundred and Twenty-five Cases of Refraction. By DR. W. S. LITTLE, Philadelphia, Pa..... 67

Report of a Case of Traumatic Paralysis of the Superior Oblique Muscle, with Treatment. By DR. W. S. LITTLE, Philadelphia, Pa..... 76

Report of a Case of Partial Paralysis of the Inferior Oblique Muscle, with Treatment. By DR. W. S. LITTLE, Philadelphia, Pa..... 80

Cases of Laceration of the Eyelids. By DR. H. D. NOYES, New York.... 82

Glioma of Both Eyes; Removal, Recurrence, Death and Autopsy. By DR. H. D. NOYES, New York..... 87

On Keratitis from Malarial Fever. By DR. C. J. KIPP, Newark, N. J.... 91

A Case of One-Sided Complete Blindness from Ischæmia Retinæ, ending in perfect Recovery. By DR. H. KNAPP, New York..... 93

Eight Sclerotomies for Glaucoma. By DR. H. KNAPP, New York..... 95

PAGE

Note On a Case of Unusual Acuteness of Vision, with Circles of Diffusion. By DR. G. C. HARLAN, Philadelphia, Pa. 103

Report of Two Cases of Cyst of the Iris (with drawing). By DR. E. WILLIAMS, Cincinnati, O. 104

Three Cases of Persistent Pupillary Membrane (with woodcut). By DR. C. R. AGNEW, New York. 110

The Insufficiency of the Ophthalmoscope as the Sole Test of Errors of Refraction. By DR. C. R. AGNEW, New York. 112

Neuritis after Measles. By DR. O. F. WADSWORTH, Boston, Mass. 125

A Case of Detached Retina Treated by Hypodermic Injections of Muriate of Pilocarpin. By DR. J. GREEN, St. Louis, Mo. 130

Exhibition of a Combination Set of Trial Glasses, and a New Trial Frame (with woodcuts). By DR. J. GREEN, St. Louis, Mo. 133

The Keratometer. A New Instrument for Measuring the Curvature of the Cornea (with woodcut). By DR. E. G. LORING, New York. 136

An Instrument for the Detection of Color Blindness (with photograph). By DR. WM. THOMSON, Philadelphia, Pa. 142

A Modification of Loring's Ophthalmoscope. By DR. H. D. NOYES, New York. 144

An Improvement in Concave Spectacle-Glasses of High Power (with woodcuts). By DR. J. GREEN, St. Louis, Mo. 147

An Acute Glaucomatous Invasion, following Closely upon a single Application of a very weak Preparation of Duboisia. By DR. J. GREEN, St. Louis, Mo. 148

An Improved Operation for a New Pupil after Cataract Operations (with woodcut). By DR. E. G. LORING, New York. 151

A Modified Operation for Discission in Soft Cataract (with woodcuts). By DR. J. GREEN, St. Louis, Mo. 158

Case of Nucleus-like Bodies in the Lenses of a Child, Escaping after Discission. By DR. J. GREEN, St. Louis, Mo. 160

Optico-Ciliary Neurotomy. By DR. H. W. WILLIAMS, Boston, Mass. 161

Case of Buphthalmus, with Central Anterior Synechia, Cured by Total Removal of the Iris By DR. H. D. NOYES, New York. 164

Dermoid Cyst of the Left Cornea. By DR. S. D. RISLEY, Philadelphia, Pa. 166

An Operation for Entropion. By DR. J. GREEN, St. Louis, Mo. 167

Photograph of the Fovea Centralis of the Retina (with photograph). By DR. O. F. WADSWORTH, Boston, Mass. 174

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AMERICAN OPHTHALMOLOGICAL SOCIETY.

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Total.....77

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DR. E. REYNOLDS.....Boston, Mass.
DR. C. SCHWEIGGER.....Berlin, Prussia.

Total..... 4
Whole number.....81

MINUTES OF THE PROCEEDINGS.

SIXTEENTH ANNUAL MEETING.

Held in the City of Newport, July 22 and 23, 1880, at the Masonic Building, corner of Church and School Streets.

NEWPORT, *July* 22, 1880.

THE Society was called to order at 10 A.M., by the President, DR. HENRY D. NOYES, of New York.

After an address of welcome by the President, in which he suggested several fertile fields for ophthalmological observation and research, the following committees were appointed. The reading of the minutes of the previous session were rendered unnecessary by their having been printed and circulated among the members of the Society.

COMMITTEE ON MEMBERSHIP.

DRS. HASKET DERBY, of Boston, CHARLES S. BULL, of New York, W. H. CARMALT, of New Haven, JOHN GREEN, of St. Louis, and GEORGE C. HARLAN, of Philadelphia, were appointed Committee on Membership.

COMMITTEE ON BULLETIN.

DRS. DAVID WEBSTER, of New York, and CHARLES J. KIPP, of Newark, N. J., were appointed Committee on Bulletin.

AUDITING COMMITTEE.

DRS. ARTHUR MATHEWSON, of Brooklyn, and F. B. LORING, of Washington, D. C., were appointed Committee on Auditing Treasurer's report.

The Treasurer, DR. RICHARD H. DERBY, of New York, read his report, which was examined and approved by the Auditing Committee.

Upon motion of the Secretary, it was voted that no assessment be levied for the present year.

The reading of the reports of the Committees on Membership and on the Election of New Members was postponed.

The report of the Committee on Bulletin was received, and the order of papers was then taken up.

1. The first paper was by Dr. David Webster, of New York, upon "Sympathetic Inflammation following Operations for Cataract."

INVITED GUESTS.

After the reading of the above paper, and before its discussion was taken up, the President read the names of the following invited guests: Dr. F. C. Hotz, of Chicago, invited by Dr. Knapp; Dr. S. D. Risley, of Philadelphia, invited by Dr. Norris; Dr. E. E. Holt, of Portland, invited by Dr. Prout; Dr. J. C. Peters, of New York, invited by Dr. Derby; Dr. S. B. St. John, of Hartford, invited by Dr. Carmalt; Dr. W. R. Birdsall, of New York, invited by Dr. Prout; Dr. J. A. Andrews, of Staten Island, invited by Dr. Webster.

The order of the Bulletin was now resumed.

2. "A Contribution to the Pathology and Treatment of Vascular Tumors of the Eyelids." By Dr. C. S. Bull.

3. "Peculiar Anatomical Development of one of the Central Arteries of the Retina." By Dr. F. B. Loring.

4. "A Case of Ectropion treated successfully by Wolfe's Method—the Transplanted Piece of Skin measuring $3 \times 1\frac{1}{2}$." By Dr. A. Mathewson, Brooklyn.

5. "The Treatment of Ectropion by Transplantation of Skin." By Dr. Lucien Howe, Buffalo, N. Y.

6. "Intra-ocular Lipæmia." By Dr. Albert G. Heyl, Philadelphia.

Upon motion, the Society adjourned in order to go into Executive Session.

The Society was called to order, and the Chairman of the Committee on Membership proposed the following gentlemen as members of the Society: Drs. Samuel D. Risley, of Philadelphia; Samuel B. St. John, of Hartford; S. Theobald, of Baltimore; Henry S. Schell, of Philadelphia, and Robert Sattler, of Cincinnati. These gentlemen were duly elected.

The Chairman of the Committee, Dr. Henry W. Williams, further reported the advisability of the following two changes in the By-laws: in section 3, second line, to substitute for "Thursday," "Wednesday," and the striking out of the sixth section. The subject of the amendment of the By-laws was laid over until the next session of this meeting.

Upon motion the Society adjourned its Executive Session.

7. "A Tabular Report of Two Hundred and Twenty-five Cases of Refraction." By Dr. W. S. Little, Philadelphia.

8. "Report of a Case of Traumatic Paralysis of the Superior Oblique Muscle, with Treatment." By Dr. W. S. Little, Philadelphia.

9. "Report of a Case of Partial Paralysis of the Inferior Oblique Muscle, with Treatment." By Dr. W. S. Little, Philadelphia.

Dr. William F. Norris, of Philadelphia, was requested to take the chair while Dr. Henry D. Noyes, of New York, read his paper upon

10. "Laceration of the Eyelids."

This paper was followed by another by the same author, on

11. "A Case of Double Glioma, with Autopsy."

12. "On Keratitis from Malarial Fever." By Dr. C. J. Kipp, Newark, N. J.

13. "Enucleation of the Eyeball" (by title). By Dr. C. R. Agnew, New York.

14. "A Modification of Loring's Ophthalmoscope." By Dr. H. D. Noyes, New York.

Upon motion the Society went into Executive Session, and the Chairman of the Committee on Membership read the following names proposed for membership:

DR. S. C. AYRES, of Cincinnati, O., proposed by Drs. E. Williams and C. R. Agnew.

DR. W. F. MITTENDORF, of New York, N. Y., proposed by Drs. R. H. Derby and H. D. Noyes.

DR. J. P. WORRELL, of Terre Haute, Ind., proposed by Drs. Wm. F. Norris and S. D. Risley.

DR. R. A. REEVE, of Toronto, Canada, proposed by Drs. C. R. Agnew and D. Webster.

DR. F. C. HOTZ, of Chicago, Ill., proposed by Drs. E. L. Holmes and H. Knapp.

The Chairman of the Committee also offered the following amendment to the Constitution to insert in article three, fourth line, after the word "attach," the words "or suffer to be attached."

The Society adjourned until 7.30 P.M.

FIRST DAY—EVENING SESSION.

The meeting was called to order by the President, DR. NOYES, at 7.45 P.M.

The Secretary read the minutes of the preceding meeting, which were declared approved by the Chair.

Dr. Jeffries demonstrated the method of testing color-blindness by means of Prof. Donder's apparatus.

15. "A Case of One-sided Complete Blindness from Ischæmia Retinæ ending in Perfect Recovery." By Dr. H. Knapp, New York.

16. "Eight Sclerotomies for Glaucoma." By Dr. H. Knapp, New York.

Upon motion of Dr. H. W. Williams, the Society went into Executive Session.

Dr. Williams then moved the amendment offered by the committee, that "Wednesday" be substituted for "Thursday" in By-law Third, and that By-law Sixth be expunged. Carried.

Dr. H. Derby, Chairman of the Committee on Member-

ship, proposed that the phrase "or suffer to be attached" be inserted in the fourth line after the word "attach," in Article 3 of the Constitution. Upon motion, this was carried.

OPEN SESSION.

The Chairman declared the Executive Session adjourned, and directed that the Society proceed to the consideration of the Bulletin.

17. "Note on a Case of Unusual Acuteness of Vision, with Circles of Diffusion." By Dr. G. C. Harlan, Philadelphia.

Adjourned.

SECOND DAY—JULY 23, 1880—MORNING SESSION.

The Society was called to order at 10 A.M. by the President, DR. NOYES.

The Secretary read the minutes of the previous session, which were approved.

The Secretary announced the receipt of a card from Louisville, Ky., informing him of the death of Dr. C. S. Fenner.

Upon motion of Dr. Agnew, the Secretary was directed to record the death of Dr. Fenner in the minutes of the Society.

Upon motion of Dr. H. Derby, it was ordered that a new copy of the By-laws be printed and sent to each member of the Society, and with the same a notice directing the attention of the members to the amendments to the Constitution made yesterday.

The Bulletin was now taken up, and the first paper which was read was that of Dr. E. Williams, of Cincinnati, Ohio, on

18. "Report of Two Cases of Cyst of the Iris, with Preparations."

19. "Three Cases of Persistent Pupillary Membrane." By Dr. C. R. Agnew, New York.

20. "The Insufficiency of the Ophthalmoscope as the Sole Test of Errors of Refraction." By Dr. C. R. Agnew, New York.

21. "Neuritis after Measles." By Dr. O. F. Wadsworth, Boston.

22. "Weber's Curved Canaliculus Knife in the Enucleation of the Eyeball." By Dr. J. Green, St. Louis.

23. "A Case of Detached Retina Treated by Hypodermic Injections of Muriate of Pilocarpin." By Dr. J. Green, St. Louis.

24. "A Case of Extreme Exophthalmus in an Infant—Recovery." By Dr. J. Green, St. Louis.

25. "Dr. Theobald's Eye-Bandage." Shown by Dr. H. D. Noyes.

26. "Exhibition of a Combination Set of Trial-Glasses, and a New Trial-Frame." By Dr. J. Green, St. Louis.

27. "Dr. Loring's Keratometer." Exhibited by Dr. O. F. Wadsworth, Boston.

28. "Photographs of Sections through the Fovea." By Dr. O. F. Wadsworth, Boston.

29. Dr. B. Joy Jeffries gave verbally a detailed statement of what has already been done by the United States Government and private corporations for the control of color-blindness and visual defects on land and sea. Connecticut is the first and only State which has established required examination of railroad employees. The various methods adopted by the Connecticut State Board of Health, who have the matter in hand, for testing color-blindness, and to be employed by the medical experts appointed, Dr. Jeffries showed and described in detail. He spoke of the uselessness of attempting to have tests carried out by the laity or by medical men who have not been specially instructed, or specially studied the normal color-sense and practically familiarized themselves with the laws of color-blindness. He cited examples of the unfortunate effect of such attempts, both for the cause of control he has advocated and the rights of the individual, as also for the standing of our specialty among the profession and laity. He explained the purposes and value of and the congressional action taken in regard to the proposed International Commission to determine standard methods of testing color-blindness, and standards of requirement of the chromatic sense and visual power. He asked for a recommendatory vote of the Society in favor of this commission and of the standard of required color-sense and visual acuteness re-

d by the Connecticut State Board of Health among rail-
employees.
"An Instrument for the Detection of Color-Blindness."
r. Wm. Thomson, Philadelphia.

on motion, the Society went into Executive Session.
Green asked that his paper on "Entropion," offered
ear, be published in the present Transactions. This was
ed.
e Nominating Committee offered the following names
cers for the ensuing year:

sident—DR. H. D. NOYES, New York.
e-President—DR. WM. F. NORRIS, Philadelphia, Pa.
ording Secretary and Treasurer—Dr. R. H. Derby,
York.
responding Secretary—DR. J. S. PROUT, Brooklyn,

lishing Committee—DRS. E. G. LORING and D. B. St.
ROOSA, of New York.

e report of the Nominating Committee was adopted,
ne above-named gentlemen duly elected.
President requested Dr. Carmalt to take the chair.
Committee on Membership recommended Newport as
ace for the next annual meeting.
Noyes suggested that many members of the Society
at it would be an advantage to hold the meeting once
umber of years in the west.
er some discussion, the attention of the Society was
irected to the consideration of the report of the com-
, and upon motion, it was decided that Newport should
place for the next meeting.
Jeffries offered the following resolutions:

d, That the Society approve of the regulation of the State Board
lth of Connecticut, in reference to the standard requirements of
power and color-blindness.
d, The Society would hereby heartily approve of the proposed
tional Commission in reference to visual acuteness and color-

blindness, and the Secretary of the Society is hereby directed to transmit this vote to the Naval Committee of Congress. Carried.

Upon motion of Dr. Webster, Dr. M. Josiah Roberts was given permission to furnish an abstract of the proceedings of the sixteenth annual meeting of the Society for publication in the *Medical Record.*

Dr. H. W. Williams moved that the following two names be offered to the Committee on Membership for nomination.

DR. J. A. ANDREWS, of Stapleton, S. I., by Drs. Agnew and Webster.

DR. H. W. BRADFORD, of Boston, Mass., by Drs. H. Derby and Dennett. Carried.

The Society adjourned its Executive Session.

OPEN SESSION.

The Society was called to order by the President, and the Bulletin was again taken up.

31. Dr. Russell Murdoch's paper: "(*a*) Combined Forceps, Cystotome, and Curette; (*b*) A Slight Improvement in the Speculum; (*c*) A Slight Improvement in the Ophthalmostat; (*d*) Their Combined Use in Modified Linear Extraction," was read by title.

Dr. Murdoch's paper, entitled

32. "Contribution in Comparative Vision: Eye of Eagle, Buzzard, Owl, Singing-Birds, and Ox," was read by title.

Dr. Charles E. Rider's paper,

33. "Notes on Cataract Extractions," was read by title.

34. Dr. Prout exhibited to the Society, Drs. H. & A. M. Knapp's (Providence, R. I.) dry cup apparatus as a substitute for Heurteloup's artificial leech. It was much cheaper than the latter and answered the purpose very well.

A new scarificator was also exhibited.

The Chairman announced that Dr. Prout's communication would be referred to the Publication Committee.

35. "A Modification of Loring's Ophthalmoscope," with woodcuts. By Dr. H. D. Noyes, New York.

36. "An Improvement in Concave Spectacle Glasses of High Powers." By Dr. J. Green, St. Louis.

" An Acute Glaucomatous Invasion following closely a Single Application of a very weak Preparation of sia." By Dr. J. Green, St. Louis.

' An Improved Operation for a New Pupil after Cataract tions " (read by title). By Dr. E. G. Loring, New York.

" A Modified Operation for Discission in Soft Cata- By Dr. J. Green, St. Louis.

' Case of Nucleus-like Bodies in the Lenses of a Child, ng after Discission." By Dr. J. Green, St. Louis.

" Mental Government of After-Images." By Dr. B. ffries, Boston, Mass.

" Optico-ciliary Neurotomy." By Dr. H. W. Williams, , Mass.

' Case of Buphthalmus, with Central Anterior Synechia, by Total Removal of the Iris." By Dr. H. D. Noyes, ork.

" Dermoid Cyst of Left Cornea." By Dr. S. D. Risley, lphia, Pa.

' An Operation for Entropion." By Dr. J. Green, uis.

Partial Tenotomy of Superior Rectus. By Dr. Richard by, New York (by title).

n motion of Dr. John Green, it was ordered that the read before the Society, or read by title, be referred Committee on Publication.

Green further moved that all papers and other com- tions intended for publication be placed in the hands Secretary before September 15, 1880, and that proofs same be sent to the several writers with the under- g that they be returned within one week after their . In case of non-compliance with this order any paper e omitted from the published Transactions at the dis- of the Publishing Committee. Carried.

Secretary read the minutes of the last session, which pproved.

n motion of Dr. H. W. Williams, the Society adjourned.

RICHARD H. DERBY, *Secretary.*

The following members were present at the meeting of July, 1880:

Dr. C. R. Agnew	New York, N. Y.
Dr. C. S. Bull	New York, N. Y.
Dr. F. Buller	Montreal, Can.
Dr. W. H. Carmalt	New Haven, Conn.
Dr. Hasket Derby	Boston, Mass.
Dr. Richard H. Derby	New York, N. Y.
Dr. John Green	St. Louis, Mo.
Dr. George C. Harlan	Philadelphia, Pa.
Dr. Albert G. Heyl	Philadelphia, Pa.
Dr. Lucien Howe	Buffalo, N. Y.
Dr. B. Joy Jeffries	Boston, Mass.
Dr. Charles J. Kipp	Newark, N. J.
Dr. H. Knapp	New York, N. Y.
Dr. W. S. Little	Philadelphia, Pa.
Dr. F. B. Loring	Washington, D. C.
Dr. Arthur Mathewson	Brooklyn, N. Y.
Dr. Wm. F. Norris	Philadelphia, Pa.
Dr. H. D. Noyes	New York, N. Y.
Dr. O. D. Pomeroy	New York, N. Y.
Dr. J. S. Prout	Brooklyn, N. Y.
Dr. S. D. Risley	Philadelphia, Pa.
Dr. S. B. St. John	Hartford, Conn.
Dr. J. J. B. Vermyne	New Bedford, Mass
Dr. O. F. Wadsworth	Boston, Mass.
Dr. D. Webster	New York, N. Y.
Dr. C. H. Williams	Boston, Mass.
Dr. E. Williams	Cincinnati, O.
Dr. H. W. Williams	Boston, Mass.

ATHETIC INFLAMMATION FOLLOWING OPERATIONS FOR CATARACT, WITH REPORTS OF CASES.

By DR. DAVID WEBSTER,

NEW YORK.

OUGH cases of sympathetic inflammation of the fellow eye ent upon operations for cataract are, fortunately, very rare, ink it probable that such cases occur more frequently than nination of current ophthalmic literature would lead us to We are not reluctant to publish our successful cases, or r partial successes, but none of us rush eagerly into print es in which we have encountered the terrible result of total vision of both eyes by sympathetic inflammation. Still, it is y that the possibility of such a result should be known, at the profession, and in counselling our patients with regard to isability of an operation for cataract, it should always be n mind. The possibility of such a result is the strongest t that can be adduced against operating upon one eye while yet useful vision in the fellow eye.

cases have come under my own observation in which the f both eyes was totally lost, and several others in which etic inflammation of various kinds occurred, but was suc- combated by treatment. One of the first mentioned oc- n the Brooklyn Eye and Ear Hospital when I was house there.

I.—The patient, a woman aged sixty-seven, was operated Von Graefe's method, downward, by Dr. C. R. Agnew. A rido-cyclitis set in soon after the operation. Atropine, to the temple, and hot applications were judiciously used, d to arrest the inflammation, and within three weeks a pain- athetic irido-choroiditis attacked the fellow eye. The eye upon had by this time lost perception of light, and was ed, but the patient refused an iridectomy upon the other after a tedious and painful inflammation atrophy of the

eyeball resulted. This case was reported by Dr. Agnew in the TRANSACTIONS OF THE AMERICAN OPHTHALMOLOGICAL SOCIETY for 1874, page 265.

CASE II.—This patient was also a woman, about sixty years of age, who had had a cataract extracted from one eye by v. Graefe's method, upward, by a well-known ophthalmologist of another State, and who presented herself at Dr. Agnew's clinic at the Manhattan Eye and Ear Hospital, with sympathetic irido-choroiditis some months later. The eye operated upon being sightless, and having undergone atrophy, was enucleated, and an iridectomy was done on the fellow eye. But these measures failed to arrest the disease, and atrophy of the eyeball was the final result.

CASE III.—This patient was a farmer, aged sixty-nine, who had a cataract extracted from one eye by v. Graefe's method, upward, by a competent eye-surgeon of this city in the spring of 1873, while the fellow eye, though the seat of incipient cataract, still retained useful vision. The eye "went badly," and, within a few weeks, set up sympathetic inflammation in the "good eye." The left eye, that from which the cataract had been extracted, was promptly enucleated, atropine was applied to the right eye, and the patient was treated by mercurial inunction, followed by large and increasing doses of iodide of potassium. After some weeks of treatment the patient was sent home to the country with his eye in a "tolerably quiet condition." His surgeon, leaving the city for a couple of months, instructed him to place himself under Dr. Agnew's care in case of relapse. The patient came to town about the first of August, the eye being painful and the vision being reduced to counting fingers at ten feet. He was treated by leeching, atropine, mercurial inunction, and iodide of potassium, as before, but the inflammation was not checked. Dr. Agnew first saw him on the afternoon of August 6th. He found the eye painful, the tension increased, and the iris pressed forward, nearly obliterating the anterior chamber. Dr. Agnew, who was about to leave the city for a few weeks, left the patient in my care, advising an iridectomy in case the eye did not improve under the treatment that was being pursued. On August 8th, the tension was much increased, the eyeball red, the cornea hazy, the vision reduced to counting fingers at six inches, and the eye very painful. With the assistance of Dr. O. D. Pomeroy, I attempted to do an iridectomy upward. The iris proved to be brittle, and the portion within the grasp of the forceps was torn away without cutting. The anterior chamber becoming

iately filled with blood, it was thought advisable not to in-
e the forceps a second time. The eye was dressed with
e and a flannel bandage applied. The pain was temporarily
d by the operation, and the patient rested well, without ano-
until the night of the 13th—five days after the operation.
nsion of the eyeball then again increased, and the patient was
to resort to anodynes. On the 15th he returned again to his
y home, with only perception of light. On September 11th he
d to the city, having suffered much pain, with hypopyon and
perception of light.

next case that I shall report is one operated upon by myself,
ch the result, though sufficiently painful, was not quite so sad
results of the three preceding cases, the loss of vision of the
thetically affected eye not being complete.

E IV.—The patient was a maiden, aged twenty-eight, upon
left eye I performed a successful cataract extraction by
efe's method, upward, on July 1, 1875. The patient was dis-
d, cured, eighteen days after the operation, and on the
f August following had vision $\frac{2}{3}\frac{0}{0}$ with $+\frac{1}{3\frac{1}{2}}$, and could read
1 with $+\frac{1}{2\frac{1}{2}}$. On October 13, 1875, I extracted the cataract
ne right eye by the same method. The eye did well for four
hen inflammation set in, the eye being red, irritable, and
, and the lids slightly swollen. Iced cloths, atropine, and
s were used, but the eye went badly, and finally healed with
e of the pupil. On February 21, 1876, I did an iridotomy, in
pe of securing an artificial pupil, but irido-cyclitis again set in,
e eye became atrophied. But this was not the worst of it. A
eks after the iridotomy, the patient came to me with sympa-
kerato-iritis of the eye which was first operated upon with such
esults. The patient left my observation before the inflamma-
mptoms disappeared, but up to the time I last heard from her,
ained sufficient vision to enable her to get about alone.

t sympathetic iritis is not always uncontrollable by the ordi-
ethods of treatment is shown by the following two cases, both
ch I watched with great care.

E V.—Mrs. A. B. H., aged fifty-seven, consulted Dr. Agnew
ne 25, 1878. Her general health was very poor. About
months previously she had a slight attack of apoplexy fol-
by right hemiplegia, from which she has never fully recovered.
also subject to rheumatic and uterine troubles. Dr. Agnew
ted the cataract from the left eye by v. Graefe's method, up-

ward, on December 18th, a preliminary iridectomy having been done six weeks previously. The bandage was removed and atropine dropped into the eye twice daily until December 25th, when, some reaction setting in, iced cloths were substituted. On the 30th it was noted that the incision presented a grooved appearance, the deeper portion having healed, while the superficial margins, failing to unite, presented a narrow ulcer extending the whole length of the incision. On January 6, 1879, twelve days after the extraction, the patient complained of pain in and about the fellow eye. Upon examination, the eye was found irritable and watery, and there was a considerable degree of deep redness throughout the ciliary region. Atropine was dropped into the eye, and although no adhesions were demonstrated, it was found that the pupil would dilate only a very little. Leeches were applied to the temple, iced cloths were assiduously applied to the eye, and a four-grain solution of sulphate of atropia was dropped into the eye six times in an hour, morning, noon, and night. An ointment of belladonna and mercury was rubbed upon the brow and forehead. The eye began to improve after a few days, and in two or three weeks the pupil became widely dilated and the symptoms of sympathetic inflammation had entirely disappeared.

On February 8th the aphakial eye had vision $\frac{15}{200}$ with $+\frac{1}{8}$, the pupil being obstructed by a membrane, and the fellow eye showed no tendency to a recurrence of sympathetic inflammation.

CASE VI.—Mrs. J. C., aged fifty-nine, had a cataract extracted from the right eye by v. Graefe's method, upward, by Dr. Agnew, on March 30, 1876, the cataract in the left eye being immature, and the eye retaining useful vision.

April 19th.—Has convalesced without pain; membrane in pupil; counts fingers.

April 25th.—As the redness passes away very slowly, applied two leeches to the temple to-day.

April 27th.—Vision $\frac{20}{100}$ with $+\frac{1}{4}$. Entered anterior chamber with Beer's knife, at temporal margin of cornea, and pierced the membrane at the nasal margin of the pupil; introduced a sharp hook and tore away the membrane from its pupillary attachments.

April 28th.—Considerable inflammatory reaction.

May 10th.—A lingering iritis just commencing to get better.

July 15th.—Sympathetic iritis of left eye. Pupil dilates only upward, adherent below. Left, vision, counts fingers at one foot.

vision reduced to perception of light. Pupil drawn up and with a thick membrane.

iritis of the left eye was vigorously combated with atropine, s, iced cloths, and anodynes, and within a few weeks we had tisfaction of seeing the pupil widely and evenly dilated, and dness had passed away from both eyes.

vember 8th.—Iridotomy with a narrow v. Graefe's knife, making ral, horizontal, elliptical pupil. This operation was done with- her, the patient sitting up in a chair. She recovered from this ion without unpleasant reaction, and on December 20th vision $\frac{8}{10}$, with $+\frac{1}{4}$. The vision remained at $\frac{20}{100}$ at the date of her sit, May 3, 1877, and when last heard from, some three years the fellow eye was quiet, and the vision of the eye operated better than at any time since the operation.

e next case I shall relate is one of sympathetic conjunctivitis, tremely rare form, I believe, of sympathetic inflammation. it may and does sometimes occur will be admitted, I am sure, ne of my colleagues, for I was present when Dr. Henry D. presented a case of sympathetic conjunctivitis to the New Ophthalmological Society, and I think the doctor said, at that that he had seen other similar cases.

SE VII.—Mrs. G., aged fifty, had a cataract extracted from her e by Dr. Agnew, at the Manhattan Eye and Ear Hospital, on ary 16, 1877. The method employed was v. Graefe's, and the ward. There was no accident in the operation, but when ndage was removed the next day it was found that the wound eopened and some vitreous had escaped. A low grade of iritis , without pain or any violent reaction, and on the forty-sixth n iridectomy was performed downward, in the hope of re- g the irritation caused by the traction of a dense membrane the pillars of the coloboma. No pain or chemosis followed peration, but on April 15th, eleven days after, it was noted he eye was undergoing rapid atrophy. The right eye, though ubject of incipient cataract, still retained sufficient vision to e the patient to get about alone. In the spring of 1879, about ears after her discharge from the hospital, she returned with a e catarrhal conjunctivitis in both eyes. The palpebral con- va was reddened and thickened, and there was a copious us discharge. The eyes were lachrymose, irritable, and sen-

sitive to light. This conjunctivitis was treated with various astringents for about two months without apparent benefit, and finally it was decided to enucleate the sensitive, shrunken eyeball. The eye was accordingly enucleated, and the next day there was marked improvement in the conjunctivitis of the fellow eye, and the improvement progressed rapidly, without other treatment than occasional bathing, until within a few weeks the disease had disappeared. The opacity of the lens has not increased, and the patient is still able to make her way about alone.

The rapid improvement of the fellow eye after enucleation of the atrophied one convinced me of what I had before strongly suspected, namely, that the conjunctivitis was entirely sympathetic in its origin.

My eighth case differs from all other cases that have come within my knowledge, inasmuch as the eye sympathetically inflamed had to be enucleated, while the eye causing the sympathetic trouble retained excellent vision to the end of the patient's days. It will be noticed that the eye recovered from the iritis which followed the cataract extraction, and which left a dense membrane in the pupil, without exciting sympathetic irritation. About twenty weeks after the extraction a secondary operation was performed, by which a portion of the pupillary membrane and a part of the adjacent iris were removed, making a clear pupil. The eye recovered from this operation without unpleasant reaction, and remained quiet, retaining good vision as long as the patient lived. But about five weeks after this secondary operation the patient returned to us with sympathetic irido-cyclitis, which had assumed a glaucomatous character. An iridectomy was done at once, with a view of arresting the disease, if possible, but only temporary relief was afforded, and in a little over two months Dr. Agnew felt obliged to enucleate the eye, which was now stony hard and constantly painful, not only for the relief of the pain, but to avoid sympathetic reaction upon the eye from which the cataract had been removed.

The peculiarities of this case, then, are: 1, the sympathetic inflammation occurred after a *secondary* operation for cataract; 2, the eye exciting the sympathetic inflammation made a good recovery, and was not itself at the time the seat of serious inflammation. It may be objected that the irido-cyclitis was not sympathetic at all, but merely coincident. Such, indeed, may have been the case, and I can only say that no other cause could be assigned, and that both Dr. Agnew and myself were strongly impressed at the time with the

that the inflammation in the second eye was the result, direct
irect, of the operation upon the first.

SE VIII.—May 14, 1874, Mrs. B. E., aged sixty-nine, rheu-
and dyspeptic, has had cataract in her right eye for two and a
ears, and the left eye is now so blind that she can no longer
her way about alone. Ether was given and the right eye op-
upon by v. Graefe's method, the section being made upward
ts middle two-thirds in clear cornea. A slight dialysis of the
as caused by the point of the knife while carrying it across the
or chamber. The portion torn away from its ciliary attach-
was removed by the iridectomy. The lens being large and the
al diameter disproportionately small, it was found necessary to
e the wound with scissors. There was hemorrhage into the
or chamber and collapse of the cornea. Sixteen hours after
peration the bandage was removed and iced cloths substituted
hope of controlling threatened inflammatory reaction.

y 24th.—Has had a painless iritis treated by leeching, atropine,
ed cloths. The pupil is filled with a membrane and is not
ble.

y 27th.—Cannot count fingers. Sent home with instructions to
for a secondary operation when the redness of the eye has
away.

tember 29th.—The coloboma is contracted and filled with a
membrane. Pierced the cornea about two lines from its lower
with a v. Graefe's knife, the point of which was carried along
gh the anterior chamber until it pierced the membrane in the
oma. A sharp hook was then passed in, the membrane caught
rawn out with the pupillary border of the iris to which it was
ed. Seizing membrane and iris with a pair of iris-forceps it
rawn out still farther and carefully excised. Thirty-six hours
he patient counted fingers readily.

ober 3d.—V. $\frac{20}{60}$ with $+\frac{1}{48}$, and reads Jaeger No. 1 with $+\frac{1}{24}$.

vember 4th.—Returns to us with irido-cyclitis of the left eye.
nsion is much increased. The eye operated upon for cataract
ffected. The patient was again etherized and a broad iridec-
downward performed upon the left eye. Extreme thinness of
rnea was remarked.

vember 5th.—Had pain in the eye and head until midnight; has
without pain since.

vember 9th.—Pain in eye for the last two mornings, but the red-
as not increased. Allowed to go home.

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Dr. Agnew and myself were strongly impressed at the time with th

April 6th.—Under above treatment there has been gradual cessation of active symptoms. The right iris is commencing to wrinkle into perpendicular folds. Has had no pain in the right eye for a week. The left still has ciliary injection and tenderness, lymph in iris and in pupil, though the lymph in the pupil has never been more than a slight cloud. She still has good perception of light in both eyes. *No synechiæ in the left.*

June 4th.—Have seen her about once a week to date. *Right*, with its "drawn up" pupil, perfectly quiet. *Left* nearly well. Good perception of light in both.

My friend, Dr. Oren D. Pomeroy, has kindly contributed the following two cases to my paper:

CASE X.—Matthew A., native of Ireland, aged sixty-four. On January 11, 1877, extracted lens from right eye; fully mature. Could see to get about with left, which was cataractous. Section of cornea performed without accident, except that the termination of the incision was rather abrupt, owing to the fact that there was an excessive arcus senilis corneæ, which apparently rendered the tissue rather brittle. On the least effort being made to remove the lens, vitreous escaped; but ultimately the lens was removed with moderate loss of vitreous, without introducing instruments into the eye. There was very moderate inflammatory reaction, no pain at all, and he did very well for a month. There was a good degree of sight. After this there was considerable iritis, which resulted in a partially closed pupil, the iris dragging far to one side. After seven weeks an iridotomy was performed, which resulted in some reaction, terminating in a slight decrease of the normal tension of the eyeball. Two months after this another operation was done by a needle on the membrane in the pupil. Considerable reaction followed this, and I suspected that phthisis might result while this operation was being recovered from. Some conjunctivitis was present in the fellow-eye, but without photophobia. I did not feel certain whether it was sympathetic or not. The patient then suddenly stopped coming to the hospital, and I lost sight of him until June 11, 1880, when he returned for relief papers to be made out in consequence of being blind. Right eyeball much atrophied, pupil closed, and no perception of light. Left eye has a closed pupil, eyeball of normal tension, field obliterated in infero-temporal quadrant. I did not encourage him to have an operation performed on this eye. He stated that

never had been pain in this eye. I inferred that this was a fair of sympathetic ophthalmia, due to the operation of extraction rmed on the right eye.

SE XI.—Mrs. M., born in Ireland, aged sixty. Senile cataract h eyes; mature in right; left counts fingers at eight feet. On 1 1, 1877, extracted lens of right eye without accident. Con- ble inflammatory reaction resulted, although she could see vell for several weeks. Iritis, however, persisted, and recurred ime to time, so that in two months the pupil was completely l, the iris evidently being considerably put upon the stretch. ellow eye became somewhat irritable, but not reddened, and dotomy was done on the operated eye, the incision being d through two-thirds of the iris in a vertical direction, so that ores were very well divided. The patient sat upright in a and was not etherized; by this means the blood collected in wer part of the chamber, so the incision was only partly ed with blood. In one week she counted fingers at ten feet, fterward further improvement resulted. The left eye was d by the operation. The inflammatory reaction was almost In three or four weeks the left eye again became irritable, and hstanding treatment developed into a kerato-iritis, with closure pupil. Intense ciliary injection accompanied the process, and was considerable pain and photophobia. The right eye was tly quiet from the time of the iridotomy. I felt an embarrass- which others have also observed, in knowing how to meet this dication. The first eye already being a moderately good one, gh the tension was a little diminished, I did not feel like sacri- it, thinking that the chances of procuring as good a visual re- the left were somewhat remote, whatever procedure were ed. After the inflammation of the left had gone on quite pain- or three weeks, I extracted the lens through a very large iri- ny. The symptoms were at once ameliorated, and after two bid fair to result in a good recovery, when she suddenly con- d a pleuro-pneumonia, and died after one week of illness.

results of these *eleven* cases sum up as follows:

our cases both eyes were lost.

ne case the eye causing the sympathetic inflammation was lost, e sympathetically inflamed eye was badly damaged.

ne case the eye causing the sympathetic inflammation was lost, e sympathetically inflamed eye recovered in good condition.

In *one* case the eye causing the sympathetic inflammation recovered with a "drawn-up" pupil and perception of light, while the sympathetically inflamed eye recovered with only slight damage.

In *one* case the eye causing the sympathetic inflammation retained useful sight, and the sympathetically inflamed eye was afterward operated upon, and gave promise of a good recovery, when the patient died, and thus prevented a knowledge of what the ultimate result would have been.

In *two* cases both eyes recovered in good condition.

In *one* case the eye sympathetically inflamed was lost, while the eye causing the sympathetic inflammation retained good vision as long as the patient lived.

REMARKS.

DR. MATHEWSON remarked that he should never forget the first case of sympathetic inflammation he saw. The operation for cataract was successful and everything passed off very nicely for five or six weeks. The patient, a lady fifty-five years of age, was operated upon after v. Graefe's method, by his friend Dr. Newton, a former member of this society. Four weeks after the operation her vision was $\frac{20}{30}$. Shortly after that, from some unknown cause, the eye became the subject of irido-choroiditis, which resulted in its loss. The other eye became affected, and sight was diminished to the faint perception of light. He had seen four or five other instances of sympathetic inflammation, not, however, in his own practice. He had not been tempted to operate upon a cataractous eye so long as its fellow retained vision.

DR. HASKET DERBY, of Boston, inquired of the author of the paper for the percentage of cases in which sympathetic inflammation occurred.

DR. WEBSTER remarked that it was impossible to tell in what proportion of cases it occurred.

DR. DERBY thought that its occurrence was very rare, for in two hundred and eighty-seven cases of v. Graefe's operation he had seen no instance of sympathetic inflammation.

DR. E. WILLIAMS, of Cincinnati, O., remarked that it had occurred to him only once in his practice to have a patient lose both eyes after operation for cataract, although he had seen several other instances of this at a late period, where he was not able to judge of the original condition of the sympathetically affected eye. In the case referred to the patient was a man of sixty-eight years, feeble in health, of a malarial disposition, and with a tendency to cardiac failure. His eyes were deeply set, of small size, and hypermetropic. He came complaining of both eyes, and an extraction downward was done after the usual modification of v. Graefe's method. On account of the small size of the cornea considerable difficulty was experienced in the removal of the small, hard lens. For a few days

ase progressed favorably; then little by little an insidious rrhagic iritis set in, and the eye operated on was lost. The it was kept under observation for two or three weeks longer nen allowed to go home, no sympathetic inflammation having red. Some weeks later, however, a letter was received from octor who had the case in charge, stating that the patient was ng from pain in the other eye. Dr. Williams directed that the it be sent at once to him, but the direction was not complied Some months afterward the patient was brought to him with eyes absolutely blind and very sensitive. Although the patient to have his second eye operated upon for cataract, Dr. ms declined. In many hundred operations this accident had occurred to him once, so that he thought the percentage of in which it occurred must be very small indeed. He had it a rule for many years to refuse to operate upon one eye of ractous patient so long as useful sight of the other remained. lways waited until the cataract had so far progressed in the d eye as to incapacitate the patient for reading, writing, or ing life. He thought this rule was certainly a safe one. Parrly had he been careful to refuse to operate upon traumatic cts where the other eye was in good condition. He thought cases were peculiarly liable to sympathetic trouble.

. H. KNAPP, of New York, did not think the advice just given d be an absolute rule of conduct. We knew that in cataract anced years both eyes would always be affected, and it might at, when the second eye became useless, the chance for a good from the operation upon the first eye was much lessened. onger the cataract existed beyond the period of maturity, the the prognosis. Cases of sympathetic ophthalmia after cataperations were rare. He would, therefore, in a general way late the indication for any extraction as follows: "Perform eration when it offers the greatest chance of success." Excircumstances may render it opportune to operate before or that period; but, if we want to do the greatest good to the st number of our patients, this rule will stand criticism. By g, for instance, five years until the cataract of the other eye has ne blind, the cataract in the first may have become hypere, degenerated, and complicated. Its removal then was rous for both eyes, whereas at the period of maturity the oper- would have been easier and a great deal safer.

. POMEROY remarked that he had been much interested in the and the discussion which it had called forth. It seemed that ight have sympathetic ophthalmia without encroaching upon the y region by the corneal incision, and he thought the shrinking of astic growths in the region of the pupil was sufficient to cause athetic inflammation. He confessed that he looked with great pon neoplastic contractions in the ciliary region after operation taract.

. NOYES said that he could contribute two cases to this ques-

tion out of two hundred or two hundred and fifty operations, making a percentage of less than one per cent.

DR. GEORGE C. HARLAN, of Philadelphia, stated that he had seen one case.

DR. WILLIAM THOMSON, of Philadelphia, remarked that he had seen two cases of sympathetic inflammation occurring after operation for cataract, but that he could give no statistics.

DR. C. R. AGNEW, of New York, stated that it was impossible to give accurate statistics on this subject, although his impression was that the cases in which sympathetic inflammation occurred ranged between two and three per cent. of the cases in which the eye operated upon was a total loss. He thought it must have been the experience of all the gentlemen present to have seen cases in their practice where the loss of an eye had followed an operation for cataract by another physician. We also knew that patients ran for long periods after extraction and then lost the eye operated upon, even though, during the interval, the vision had been satisfactory. He had seen cases where this occurred ten or twelve years after extraction, so that there was always that source of error.

A CONTRIBUTION TO THE PATHOLOGY AND TREATMENT OF VASCULAR TUMORS OF THE EYELIDS.

BY DR. CHARLES STEDMAN BULL,

NEW YORK.

ANGIOMATA of the eyelids and vicinity may be both cavernous and teleangiectatic: the latter being the most frequent and almost always congenital, while the former are rarer and are generally not congenital, but make their appearance during childhood or youth. It is certain that, in almost all the cases where the skin is involved, the growth has been congenital or appeared in very early infancy, and the probability is that the same thing is true of the angiomata that are more deeply seated, though from their very nature they are more likely to be overlooked. These tumors have been known to occur late in life and here may be of traumatic origin. When seated entirely beneath the skin, the latter is generally healthy; but when the skin is involved, even though but slightly and in its deepest parts, it becomes livid and often very thin. Most of these tumors, whether cavernous or teleangiectatic, are of a capillary or venous nature, and

rely is the blood-supply and the vessels directly arterial. oint of difference between them it is very important to de-, as it has a bearing upon the nature of the operative treat- The growth of these vascular tumors, whether congenital or very uncertain. They often increase in size *pari passu* with of the body, but perhaps as often remain stationary for a long d then suddenly grow very rapidly without any apparent cause. le, the more superficial an angioma is, the more apt it is to be y in structure and teleangiectatic, while the deeper growths erally venous and of a cavernous structure; but there are ons to both these rules. The angiomata may here grow to a ge size, which is probably due to the great vascularity of the nd to the looseness of the mesh-work of the subcutaneous ive and adipose tissue. The larger the tumor, the more like- to be venous and cavernous, and the greater the probability ing encysted; for the more perfectly it is surrounded by con- tissue, and the more closely pressed together are the bands ective-tissue fibres, the more completely is the tumor encap- This is of importance in deciding upon excision for its re- for if the growth has a distinct cyst-wall, its dissection is asier and the chances of hemorrhage are much smaller, al- so many vessels perforate this capsule that it is by no means ct wall.

e cavernous angiomata on section resemble similar growths re in the body—the interior meshes of the trabeculæ are gen- ner and the spaces not so large as in regions where there is onnective tissue. If the cyst-wall is accidentally opened ts removal, the contents gush out at once and the tumor col- lmost completely, showing the intimate connection between ces. The interior aspect of these cavernous angiomata is not r, always the same, for the trabecular appearance is sometimes e, and even entirely absent. Paget speaks of parts of the r structure being consolidated with blood-clots or with partial tion of the vessels, and even of complete consolidation by e inflammation.

her change that sometimes occurs is the transformation of a us angioma into a sanguineous cyst. This probably results enlargement and coalescence of the venous channels, this ing confirmed by the mouths of veins having been found into the cyst. The contained blood is here venous and and the cyst-wall generally very thin and not easy of dissec

sitive to light. This conjunctivitis was treated with various astringents for about two months without apparent benefit, and finally it was decided to enucleate the sensitive, shrunken eyeball. The eye was accordingly enucleated, and the next day there was marked improvement in the conjunctivitis of the fellow eye, and the improvement progressed rapidly, without other treatment than occasional bathing, until within a few weeks the disease had disappeared. The opacity of the lens has not increased, and the patient is still able to make her way about alone.

The rapid improvement of the fellow eye after enucleation of the atrophied one convinced me of what I had before strongly suspected, namely, that the conjunctivitis was entirely sympathetic in its origin.

My eighth case differs from all other cases that have come within my knowledge, inasmuch as the eye sympathetically inflamed had to be enucleated, while the eye causing the sympathetic trouble retained excellent vision to the end of the patient's days. It will be noticed that the eye recovered from the iritis which followed the cataract extraction, and which left a dense membrane in the pupil, without exciting sympathetic irritation. About twenty weeks after the extraction a secondary operation was performed, by which a portion of the pupillary membrane and a part of the adjacent iris were removed, making a clear pupil. The eye recovered from this operation without unpleasant reaction, and remained quiet, retaining good vision as long as the patient lived. But about five weeks after this secondary operation the patient returned to us with sympathetic irido-cyclitis, which had assumed a glaucomatous character. An iridectomy was done at once, with a view of arresting the disease, if possible, but only temporary relief was afforded, and in a little over two months Dr. Agnew felt obliged to enucleate the eye, which was now stony hard and constantly painful, not only for the relief of the pain, but to avoid sympathetic reaction upon the eye from which the cataract had been removed.

The peculiarities of this case, then, are: 1, the sympathetic inflammation occurred after a *secondary* operation for cataract; 2, the eye exciting the sympathetic inflammation made a good recovery, and was not itself at the time the seat of serious inflammation. It may be objected that the irido-cyclitis was not sympathetic at all, but merely coincident. Such, indeed, may have been the case, and I can only say that no other cause could be assigned, and that both Dr. Agnew and myself were strongly impressed at the time with the

that the inflammation in the second eye was the result, direct irect, of the operation upon the first.

SE VIII.—May 14, 1874, Mrs. B. E., aged sixty-nine, rheu- and dyspeptic, has had cataract in her right eye for two and a ears, and the left eye is now so blind that she can no longer her way about alone. Ether was given and the right eye op- upon by v. Graefe's method, the section being made upward s middle two-thirds in clear cornea. A slight dialysis of the s caused by the point of the knife while carrying it across the or chamber. The portion torn away from its ciliary attach- was removed by the iridectomy. The lens being large and th l diameter disproportionately small, it was found necessary to e the wound with scissors. There was hemorrhage into the or chamber and collapse of the cornea. Sixteen hours after peration the bandage was removed and iced cloths substituted hope of controlling threatened inflammatory reaction.

y 24th.—Has had a painless iritis treated by leeching, atropine, ed cloths. The pupil is filled with a membrane and is not ble.

y 27th.—Cannot count fingers. Sent home with instructions to for a secondary operation when the redness of the eye has away.

tember 29th.—The coloboma is contracted and filled with a membrane. Pierced the cornea about two lines from its lower n with a v. Graefe's knife, the point of which was carried along h the anterior chamber until it pierced the membrane in the oma. A sharp hook was then passed in, the membrane caught rawn out with the pupillary border of the iris to which it was ed. Seizing membrane and iris with a pair of iris-forceps it awn out still farther and carefully excised. Thirty-six hours he patient counted fingers readily.

ober 3d.—V. $\frac{20}{60}$ with $+\frac{1}{45}$, and reads Jaeger No. 1 with $+\frac{1}{25}$.

vember 4th.—Returns to us with irido-cyclitis of the left eye. nsion is much increased. The eye operated upon for cataract ffected. The patient was again etherized and a broad iridec- downward performed upon the left eye. Extreme thinness of rnea was remarked.

vember 5th.—Had pain in the eye and head until midnight; has without pain since.

vember 9th.—Pain in eye for the last two mornings, but the red- as not increased. Allowed to go home.

crease in size until it reached its present dimensions. It caused no pain, but was a marked inconvenience from the ptosis it occasioned. The patient was told that the tumor could be removed, and that the operation had better be done at once, as it might ulcerate, and give rise to profuse hemorrhage. This she declined to have done, and went away, and did not appear again until two months later, November 28, 1879, when the tumor had increased somewhat in size. The lid could be partially raised by the action of the levator palpebræ muscle, and the orbicularis acted well, and seemed to diminish slightly the size of the tumor, by making it less prominent. The patient now consented to an operation, and she was anæsthetized and a lid-clamp carefully and firmly applied. The base of the tumor or pedicle was about half-way between the eyebrow and ciliary margin of the lid. An incision was made through the skin covering the apex of the tumor and parallel to the lid margin. The skin was very thin, and it was with the greatest difficulty that it could be dissected up without injuring the cyst-wall. By means of blunt-pointed scissors and a strabismus-hook this was, however, done, the adhesions being nowhere firm until the base was reached. Here it was firmly adherent to the deep fascia, and in its growth had pushed the fibres of the orbicular aside. In attempting to detach the base of the cyst its wall was opened, and a large quantity of dark fluid blood poured out, and the tumor immediately collapsed. The cyst was then easily dissected out entire from its bed, and the cavity in the lid carefully washed out and sponged dry. An examination showed that the angioma had been developed in the fibres of the orbicular muscle and the underlying connective tissue; but the tarsus was not involved, for its upper border was only on a line with the pedicle of the tumor. When the clamp was loosened the cavity filled almost immediately with blood, which seemed to come from all sides, showing that the venous channels were very numerous. It was not deemed advisable to use any hæmostatic, so the lid-clamp was reapplied, and kept in position until all oozing had ceased. The lips of the wound were then closed by sutures, and a pressure bandage applied. During the night the hemorrhage recurred beneath the bandage, and on the removal of the dressing the cavity was found filled with clots, and the lid infiltrated and inflamed. During the day a bleb formed on the surface of the lid, and ecchymoses occurred in the lids of the other eye, and in several spots on the face. The cavity was again cleansed, and left open, and moderate cold applied. The hemorrhage did not recur, the bleb subsided, the

ynoses were slowly absorbed, and the cavity began to granulate
the bottom, and in three weeks was entirely healed. The
e process was very slow, which may be ascribed to the general
vorable condition of the patient.

examination of the cyst showed that the wall was thickest
rd the apex of the tumor, and when it was laid completely
, it was seen to be a mixed cavernous angioma and sanguineous
There were some few fibrous bands or trabeculæ remaining,
hey were short and imperfect, and the main part of the interior
one large cavity. Microscopical examination of sections of the
of the sac showed that it consisted of layers of fibro-cellular
e closely pressed together, perforated on all sides and in all
tions by blood-vessels, most of them veins and some quite large.
cyst seemed to have been developed in the substance of the
ular muscle, for on the outside of the cyst-wall were muscular
, some running longitudinally and others seen in cross-sec-
while most of the fibres of the muscle were at the bottom of
cavity containing the cyst, and had been pushed aside by the
th of the latter. The vessels, especially the veins, were filled
blood-cells, and on the inside of the wall were several large
ies filled with blood-corpuscles, into which numerous vessels,
ly veins, opened. These sinuses no doubt communicated with
arge central cavity. At various points in the wall of the cyst
was a cavernous arrangement of the fibres, the spaces existing
being filled with blood-corpuscles. An interesting point in the
ology of these blood-cysts of the lids, and heretofore briefly
red to, is the possible transformation of a dermoid cyst into a
d-cyst. This was not suspected in the case referred to at the
of operation, nor until the microscopic examination showed
pectedly some of the constituents of a true dermoid cyst. The
is as follows:

ASE II.—The patient was a man, aged twenty-three, who said that
had been a small red swelling, as large as a large pea, in the
r lid near the inner canthus, as long as he could remember. It had
r occasioned him any inconvenience until within a year, during
h period it had grown markedly in size, and caused pain and a
e of weight in the lid. When he presented himself to the writer
e was a tumor the size of a large walnut, with a broad pedicle,
ing down from the upper lid, about midway between the ciliary
upper border of the tarsus. The overlying skin was deep red,

almost purple in color, and somewhat movable over it. Contraction of the orbicular muscle made no alteration in its size, but stooping or bending over increased it in size. There was no pulsation or thrill, and it was not especially sensitive on pressure. Its base seemed to be attached to the tarsus. It was determined to remove it by excision, and a lid-clamp was placed in position, and screwed firmly down. An incision was then made horizontally through the skin covering it, and the latter was carefully dissected up on all sides. It was found very thin, and the orbicular fibres had either been pushed aside or were atrophied, as none were perceptible. The cyst-wall was successfully detached until the base was reached, but here the adhesions were firmer, and unfortunately the knife opened into the cyst, and a quantity of very dark and fluid blood escaped. The cyst immediately collapsed. There was but very little oozing of blood, and the tumor was easily dissected out and removed. The cavity was then cleansed and examined for bleeding vessels, but none were found. As soon, however, as the clamp was loosened, the hemorrhage became quite profuse and seemed to come almost entirely from the nasal end. A small carbolized catgut ligature was applied around a bunch of bleeding vessels, all clots were removed from the tissues of the lid, the wound was carefully closed by sutures, and a pressure bandage applied. The wound healed rapidly except at the nasal end, from which a thin discharge exuded for nearly a week. This then closed, and there has been no further trouble. The man has complete control over both the orbicular and levator muscles of the lid, though there is still some ptosis.

The cyst was hardened in Müller's fluid and alcohol, and sections were then cut for examination. A microscopical examination of a number of sections made through different parts of the cyst-wall showed that the tumor had undoubtedly been a dermoid cyst, developed in the deep connective tissue of the lid, and involving the tarsus at the point where the base was most adherent. The wall was composed of numerous layers of connective-tissue fibres, very densely pressed together, but, contrary to what is usually found in dermoid tumors, the wall was perforated by numerous blood-vessels, more or less filled with blood-corpuscles, and opening either into sinuses in the cyst-wall or into the main cavity in the interior. Bands of muscular fibres could be traced in part over and in the wall; and at the base, where the wall was thickest, could be seen part of the structure of the tarsus, with remains of the Meibomian glands. The sinuses in the wall were filled with blood-corpuscles,

ne of them were of large size. At one or two points on the surface were short hairs projecting into the cavity, their being lined with cylindroid epithelium. No trace of any se- contents existed, such as ordinarily is found in dermoid and the extreme vascularity of the wall was another point of ce. According to the patient's story, the tumor dated from was probably congenital, and had always been red, and he wall was highly vascularized. That the tumor had been e beginning a blood-cyst is not probable from the micro- structure of its wall. Why it should have remained quies- so many years, and then have suddenly taken on a rapid without any known cause, does not admit of an explanation. ry, such as a blow, might have excited inflammatory action umor; but this would have probably terminated either in tion of its contents and ulceration through its walls, or in the on of a clot from internal hemorrhage from some of the nu- vessels in the wall of the cyst, which in its turn would y have broken down and disintegrated. The case is of in- om its apparent inexplicability. The deep extension of the into the tissue of the tarsus recalls a case of teleangiectasia lids of one eye, reported by Schirmer in the *Arch. für lmologie*, VII., 1, p. 119, in which the vascular enlargement ted the conjunctiva, and even extended to the ocular con- . This case also existed from birth.

words in closing in regard to operative procedures. I most atingly affirm that I prefer excision by the knife to the other s of treatment for the ordinary vascular tumors met with in Dr. Knapp, in a very interesting paper in the *Archives of lmology and Otology*, V., Nos. 3 and 4, pp. 514 to 524, also for extirpation advantages over all other methods of treat- While recognizing the possible dangers from hemorrhage, he ow the latter can be obviated or controlled. The lid-clamp of Desmarres or Snellen, or Knapp's modification of Des- instrument, should always be used, as the blood-supply is tirely cut off, and the operation can thus be made almost ss. If the tumor involves the ciliary margin of the lid, its l may necessitate a subsequent plastic operation to remedy ect in the lid; but angiomata are not so common in this n as they are higher up on the lid. Knapp recommends here extirpation of the tumor, excising the epitarsal part, and

trusting to shrinking of the deeper parts in the tarsus from loss of its blood-supply through the divided epitarsal vessels. Of course, in the larger angiomata which extend into the orbit, some further steps are necessary, a discussion of which is beyond the limits of this paper. This latter class of tumors is considered in Knapp's paper, before referred to.

REMARKS.

DR. AGNEW remarked that, if he remembered rightly, the doctor, in his narrative, did not describe a case occurring higher than the upper eyelid. He had seen one four weeks previous that occupied the upper half of the eyebrow. He agreed with Dr. Bull that the clamp was necessary in operating for the removal of such growths. In this case, however, he did not use it, and thought that some modification of the forceps would have to be made in order to clamp the tumor in that region. If he were to operate again in that region, he would modify the forceps so as to include the tumor.

DR. KNAPP thought we should remove these tumors as soon as they were brought to our notice. A year ago he had seen an excessively large one, by the kindness of Dr. Frank, of Baltimore. It had been allowed to grow for fifteen months. The eye was pushed toward the nose, and large vascular tumors occupied the corresponding side of the face, being then beyond all treatment. Dr. K. was sure that in its initial stage the tumor might have been easily removed.

PECULIAR ANATOMICAL DEVELOPMENT OF ONE OF THE CENTRAL ARTERIES OF THE RETINA.

BY DR. F. B. LORING,

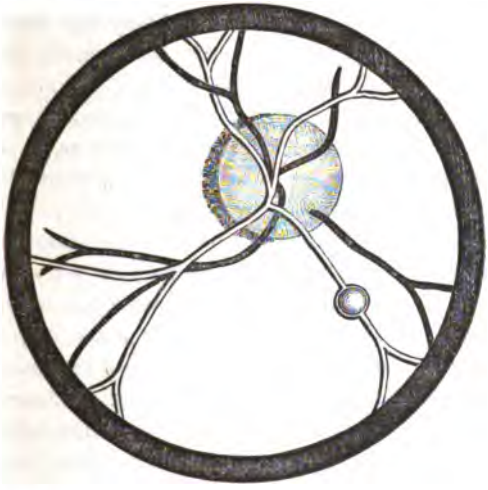
WASHINGTON, D. C.

THE following case is not one that can claim, perhaps, much importance in a clinical point of view, but is one that seems worthy of publication, on account of a peculiar anatomical development of one of the central arteries of the retina.

Mr. H. consulted me, some time since, on account of a slight attack of phlyctenular keratitis in the right eye, that yielded most readily to treatment. On his last visit he requested me to make a thorough examination of his eyes, as, being a deaf-mute, he was

ependent on them, and was anxious to know if an early use es would be of benefit to them.

eyes were emmetropic in refraction; V.=$\frac{20}{20}$—,A. good, and l and color-perception normal. Under the ophthalmoscope lia and lenses were clear and transparent, and the retina and normal in every respect. In the left eye, however, the lower of the central artery presented a most peculiar bulging of its ircumference. This annular enlargement took place below rgin of the papilla, at a distance corresponding to about urths of its diameter, and was situated at about two-thirds of tance between the lower edge of the disk and the first ion of the artery taking place below it, its central diameter early three times as great as that of the vessel proper. Its as lighter than that of the artery, and the "light streak" ter-



abruptly at its origin, beginning again immediately below ere was no pulsation attainable by pressure and there was s of the blood-column above it. The fundus was singularly m blood-vessels in its near neighborhood, thus allowing a act examination to be made with ease. The patient was a nd healthy man of twenty-five years, and a careful examina- heart and lungs proved both to be normal. His hearing had st in early infancy, from an attack of measles.

principal points of difference that this case presents to the of cases of aneurismal dilatation already reported, are, I

think, chiefly confined to the two following: *First*, that the vision and functional processes of the eye were not affected; and *Second*, that there was no pulsation, either of a spontaneous nature, or to be obtained by pressure.

The first of these is due probably to the fact that the dilatation of the artery took place after the vessel had emerged from the nerve, so that there was no compression of its fibres, as in the pathological preparation now in the possession of Professor Schmidler, of Friburg, in which the aneurisms compressed the optic nerves of both eyes, and in which vision was completely lost, with the exception of a faint perception of light in looking downward (*Dictionnaire des sciences médicales*, tome xxv., p. 20). A similar case is also reported by v. Graefe (*Angiectasie*, p. 32, Leipsig), in which the central artery was dilated to the size of a blade of grass, while yet within the nerve, and in which the blood-vessels of the retina were varicose. In this case the loss of vision was probably due directly to compression, as in the case of Cooper. In the present instance, however, the expansion was considerably below the point of exit from the nerve, and in such a position that the enlargement would produce the least possible amount of harm; and, moreover, it had not progressed to an extent sufficient to impede the flow of blood through it to the tissues below.

In the second place, in regard to the pulsation, Sous reports a case (*Annales d'oculistique*, 1865) of a woman of sixty-four years, in which he found a *red* ovoid tumor on the left optic nerve, extending below its margin, and presenting evident signs of pulsation, the dilatation being synchronous with the systole of the heart.

It is, however, a well-known anatomical fact that aneurisms, even of a considerable size, *do* exist, without pulsation, when the walls have been thickened by deposits of coagulated blood and successive layers of fibrin, and that this process, particularly in the smaller arteries, is often a means of spontaneous cure.

That this conservative process had, to some extent, taken place in Sous' case, seems probable from these facts, viz.: that pulsation did not exist; that the color of the enlargement (unlike that of our case) was lighter than that of the vessel proper, and that there was an entire absence of the illuminated spot, corresponding to the "light streak" of the cylindric vessel, that we should expect to find on the convexity of the dilatation, if the latter were completely filled with blood, with walls possessing the same, or an increased degree of transparency.

SE OF ECTROPION TREATED SUCCESSFULLY BY OLFE'S METHOD, THE TRANSPORTED PIECE OF KIN MEASURING THREE BY ONE AND ONE-HALF CHES.

By DR. ARTHUR MATHEWSON,

BROOKLYN, N. Y.

following case of skin-transportation for relief of ectropion is ed as an illustration of the value of the method introduced by and as an addition to the record made by Wolfe, Wadsworth, Zehender, and Aub, in the eight previously reported cases. s specially worthy of note from the size of the transported flap 1½"—and the completeness of its union and preservation.

Moulton, aged twenty-one, was burned when a child of five he whole left side of the face and forehead being now with cicatricial tissue, upper eyelid completely and its ciliary margin upward on the supra-orge. The condition of the ding tissues being such as er the success of other s doubtful, an operation e's method was performed Brooklyn Eye and Ear l, May 1, 1880. In order e as much vascularity of s possible, they had been ed to a sort of massage e weeks previously. The lid was freed from its ns by an incision parallel to and a little above its ciliary margin, dissection continued till the edge of the lid could be turned nd easily brought in contact with the edge of the lower lid, to was fastened by four sutures. The gap thus formed was elliptiape, two inches in horizontal length, and an inch and a quarter est vertical diameter. To fill this gap an elliptical piece of skin

three inches long by one and one-half in breadth was dissected from the left side over the seventh rib, care being taken to include as little as possible of the subcutaneous adipose tissue, and laid at once upon the raw surface prepared for it, which at the time it seemed to fit pretty accurately, having shrunken somewhat, though still thicker and more prominent than the surrounding parts. A superficial stitch was put in at either end of the ellipse to aid in holding the flap in place, and the whole covered with a thin, transparent plaster made of gold-beater's skin, cut large enough to extend toward the borders of the orbit and fastened at the edges by flexible collodion. Over this was laid a piece of soft muslin thoroughly smeared with vaseline, so that it could be easily removed without disturbing the plaster. A mass of absorbent cotton covered this, and a flannel bandage covering both eyes, and drawn tight enough to keep the transported skin closely pressed against the subjacent parts, completed the dressing.

The operation occupied thirty-three minutes, the patient being under the influence of ether, which did not cause much vomiting or subsequent depression. She was kept in bed, and small doses of whiskey given frequently, with the idea of promoting the activity of the circulation of the skin. The dressings external to the plaster were left undisturbed till the fourth day after the operation, and when removed revealed the transported piece in perfect coaptation, and assuming more of the color of the adjoining skin and less ghastly white in appearance than when first applied. So far as could be judged from appearances, there was union by first intention throughout, except that the length of the transported piece proved to be greater than was necessary; and there was a little overlapping at the ends of the ellipse, which became hard and dry superficially, and were subsequently pared off by the scissors. The external dressings were renewed in order to keep the parts warm and under pressure. The transparent plaster was not removed till the twelfth day, when it had become loosened. The sutures had been previously removed by lifting the edges of the plaster. For many days the tissues were so thick and swollen that the eye was completely closed; but before the end of a month considerable shrinking took place, and went on till the eye could be well opened and shut, as shown in the figures from photographs taken July 19th. At this date the transported piece measured as nearly as possible $1\frac{1}{4}'' \times \frac{3}{4}''$. For the last two or three weeks before this the shrinking process had seemed to come to a termination. In the third and fourth weeks after the operation there occurred an ulceration of the superficial parts of the skin

the ends of the ellipse, as in ordinary skin-grafting; but at
o-thirds of the flap, including the middle portion, remained
vithout ulceration, losing only the thinnest pellicle, such as
ome away from a slightly
ied surface.

eye is now well protected,
deformity in great meas-
eved, as shown by the pho-
s, though the lid is not very
owing, perhaps, in part, to
kness of the skin employed
sportation.

the above operation I
d the opportunity of assist-
another of the same kind,
as performed, June 15th,
riend, Dr. L. S. Pilcher, of
n, by whose courtesy I am
ed to refer to it here. The
was a woman of thirty
ubject to epileptic attacks, in one of which she fell in the fire
badly burned on the left side of the head and face, the resulting
ial contraction producing extreme eversion of both upper and
ds. Wolfe's method was tried for the relief of the ectropion
pper lid—the gap of $2'' \times 1.3''$ being filled by a piece of skin
$.7''+$, taken from the inner surface of the upper arm. This
ch thinner than that in my own case taken from over the ribs,
ank at once much more, so that it hardly filled the gap with-
tching. No sutures were used to hold the flap in place, as
erience in my case seemed to prove them undesirable; but
e procedures were followed in every other respect. Union
out took place in spite of much vomiting from ether and a
ent epileptic seizure. The present result is very satisfactory,
opion being completely relieved, while the lid is much more
than in my case. An attempt to relieve the ectropion of the
d, by sliding upward a triangular flap from the cheek, made
ame time, failed of success.

experience of these two cases under my own observation,
e history of those reported by others, leads me to think that
bility of very considerable pieces of skin transported with
care may be relied upon in the majority of cases. As to the

size of the transported piece relatively to the gap to be filled, the most desirable place from which to take it, its thickness, flexibility, tendency to shrink, etc., with reference to adaptation to most perfect and permanent relief of ectropion—these questions can only be decided by time and comparison of results in different cases. Thus far the thinner and more flexible skin from the inner surface of the upper arm has seemed to serve the purpose best.

The plan of keeping the parts under moderate pressure warm by plenty of covering, and of promoting the activity of their circulation by frequent small doses of alcoholic stimulants during the critical period, seems to me logical.

NOTE.—December 18, 1880.—I have recently assisted Dr. Pilcher again in operating by transportation on the *lower* lid of the patient above referred to, where the method by sliding flaps had failed, leaving large cicatrices, and to-day had the satisfaction of seeing a very great improvement, in spite of loss of one of the two transported pieces from an erysipelatous attack.

My colleague, Dr. Rushmore, has also, within a few weeks, employed Wolfe's method, with thus far satisfactory results, for relief of ectropion of both upper and lower lids, in the case of a young boy whose face had been frightfully burned.

THE TREATMENT OF ECTROPION BY TRANSPLANTATION OF SKIN.

BY DR. LUCIEN HOWE,

BUFFALO, N. Y.

ALTHOUGH this method of operation is not entirely new to the profession, it has not, I believe, been formally brought to the notice of this society; and that fact, together with the apparent importance of the subject, would seem to warrant a few practical considerations concerning its application in a special instance, and the deductions to be made concerning it.

The ancient Indian plastic operation was simply modified by Tagliacozzi, when he took the flap from the arm instead of from the forehead or cheek, as had been previously done. In both instances, of course, an attempt was made to keep up the circulation till after the part had attached itself. But when M. Reverdin proved that small

s of skin, after being entirely removed, would again grow on rating surface, it was the demonstration of a new principle. ethod has been known from the first to English readers as "grafting," and I think we should retain the term "transplan- to indicate the transfer of large flaps having no pedicle to ounds of corresponding size. This distinction is to a certain arbitrary, and one merges into the other, just as in practice er method was gradually developed from the former. They n, however, of quite recent date, and so few names, compara- have thus far been identified with the different stages of the , that it is not difficult to trace the transition.

Lawson[1] was probably the first to employ grafting for the nt of ectropion, and even in his earliest cases, ten years ago, se of particles as large as a three-penny piece, although in had recommended that they be much smaller. In 1872 Ollier[2] transplanted pieces still larger; the same year, 's suggestion in the "Annales d'oculistique" indicated a fur- provement; and in 1875 Dr. Wolfe reported two cases where ured integument was replaced "by a larger flap dissected e forearm, and entirely separated from its attachment." At h International Ophthalmological Congress, Dr. Wadsworth, on, also demonstrated the advantages of this method. Two favorable cases have recently been reported by Dr. Aub, of ati, and one by Dr. Noyes, while Zehender has made two s in the same direction, with partial success. The trans- on of large flaps has therefore been confined to ophthalmic , and indeed the possibility of such an operation seems to have estioned or entirely ignored by some of the best surgeons.

following passage from Holmes' Surgery illustrates the man- which such attempts are usually regarded. The writer says: r relates a case of partial success in the formation of a new a lady, by a piece of integument completely cut away from h; and Hoffacher, who was officially appointed to attend at s frequent among the students at Heidelberg, mentions some able instances, which are attested by Chelius and Vel- the reunion of parts completely sliced off by sword-cuts, rtions of the nose, lips, or chin. But no such license can ved in plastic surgery. The flap must retain its connection

[1] Lancet, Nov. 19, 1870.
[2] Bull. de l'acad., 2e Sér., I., 7, 1872.

to the adjacent living structure by a pedicle, which is to be severed only after complete union and cicatrization of the raw surfaces."

The error of such statements has been sufficiently demonstrated by the results of cases already referred to, and I venture to add still another to the list, for the reason: 1, that, from all I can learn, the transplanted flap was larger than any thus far mentioned; 2, that the plan of procedure differed slightly from that adopted by others; and 3, that while the operation is still on trial, each attempt furnishes important evidence for or against its final adoption. The

following outline of the case alluded to is made from more extended notes recorded at the time:

In February, 1877, I was consulted by a young lady who, when a child, had fallen face foremost into an open fire, and the injury sustained had resulted in an unsightly cicatrix, which covered the right half of the forehead, drawing together the surrounding tissues and producing an ectropion of the upper lid of the most complete type. At least the outer third of the line of the lashes blended with the eyebrow, and the remaining portion also displaced to such a degree as to expose almost the entire surface of the conjunctiva. The palpebral portion of this membrane had become swollen and thickened,

ough it was quite impossible to close the eye, the ocular of the conjunctiva was not greatly injected, and the cornea l entirely clear.

atient also had convergent strabismus of the same eye, ap- of cicatricial origin, and the vision with +30 cyl. 90° was . In this case it would have been a hopeless task to take on the forehead or cheek and twist it into an eyelid, and the nethod therefore appeared at first to offer the best prospects ess. As a matter of preliminary trial, the arm was simply

the desired position by means of bandages, but after one night this arrangement was found to be sadly imperfect. An ne was then made, which, being fastened to the head, held ised arm firmly in place, but at the end of forty-eight hours was so excessive that the patient begged to be released.

while my attention had been directed to the operation of ntation, which in the present instance seemed to be partic- ppropriate.

rdingly, on March 21, 1877, chloroform was administered to ent, and after correcting the strabismus, I proceeded to bring e lid by making an incision parallel to the line of the lashes,

and just above them, which extended from the outer to the inne angle of the eye. The edge thus liberated was drawn down into it original place, but the thickened conjunctiva persisted in rollin outward instead of inward, and threatened to become a serious ob stacle to success. One end of a thread was therefore carried up ward, transfixing the hypertrophied membrane in the vicinity of th cul-de-sac, and near the inner angle of the eye, while the other end also armed with a needle, was passed through a corresponding poin near its outer portion. The conjunctiva was thus bent upon itse and suspended as it were over the thread, the extremities of whic were attached to the forehead. Moreover, the strip containing th lashes was also fastened to the lower lid by three strong sutures, in o der to avoid all unnecessary motion of the parts. There was thus pr duced upon the outer surface of the upper lid an elliptical woun which measured rather more than $1\frac{3}{4}$ inch in its longitudinal dian eter and over an inch transversely. Its surface was even, free fro fat, partially glazed, and bleeding very slightly.

Before commencing the operation a paper pattern of the desire flap had been made, and its outlines traced in ink upon the inne aspect of the right arm. It measured $3\frac{1}{8}$ inches long by $1\frac{3}{8}$ inc wide, being, of course, of elliptical shape, and this flap was careful dissected up by an assistant, while the eye was being manipulate as above mentioned. Previous to the entire detachment of the piec however, four fine sutures were introduced at the extremities of t principal diameters, for the sake of greater convenience in handlin and readiness in attaching it. The assistant was careful to free surface from superfluous fat, and it was also placed upon the pr pared spot without unnecessary delay.

It will be observed that the transplanted flap was very much larg than the space to be covered; but this allowance for contraction w none too great, and some slight difficulty was experienced in adjusti the edges, which were finally united by six or seven sutures in additi to the four already mentioned. The flap was then covered with a pie of gold-beater's skin which extended beyond the edges of the woun and the region of the eye being thickly padded with charpie roller-bandage was applied. The outer dressings were not disturb for forty-eight hours, when, on removing the charpie, the parts we found to be in the desired condition, and the skin could be seen its normal color.

On the eleventh day, the stitches holding down the upper lid, g:ther with the thread under the conjunctiva, were removed and t

ius found to be entirely corrected. On the fourteenth day
er half of the flap became discolored, and this appearance
d gradually over its entire surface, but involved only the epi-
ayer, beneath which, a new one had been produced. On the
enth day, however, the inner corner of the flap appeared to
e seriously threatened, and a small strip along the edge,
ng two lines in breadth and four in length, became dry and
ached. On the 25th of April—about one month after the
on—a photograph was taken of the patient, which illustrates
portionately large size of the flap.

continued to shrink, however, and two months later presented
pearance shown in the second photograph, being then less
½ inch long and ⅜ inch wide. In this, it will be noticed
e wound on the arm had healed after the usual manner of
ranulating surfaces. The patient left Buffalo for her home
, July 1, 1877, and letters, since received, state that the
fects still continue as apparent as when the last photograph
ken. The movements of the lid are naturally much restrict-
otherwise the eye gives her no trouble, and looks infinitely
han at first.

one such case it is evidently impossible to form any con-
s as to the requisites for success; but, comparing this single
tion with the experience of the writers before mentioned, I
infer it were advisable—

the surface of the wound:

hat it be clean, and free from adipose tissue.

hat its base be even.

hat there be little or no hemorrhage at the moment of trans-
on.

, as to the flap:

hat it be at least one-third larger than the wound.

hat its inner surface be clean and free from fat.

hat it be subjected to no undue violence.

hat it be secured in its new position without delay.

lly, as to adapting the parts to each other:

hat the edges should fit evenly.

hat they should be secured firmly.

hat the parts should be kept warm and dry for at least
four hours.

advantages of this method are so evident as to require but
rds of explanation:

1. A second scar is not produced in the attempt to rectify the deformity, as by the Indian operation.

2. There is no pain caused by keeping the arm immovably fixed as by the Italian operation.

3. The edges of the transplanted flap can be adjusted with the greatest nicety, which is not the case with either of these methods.

4. If the attempt should prove a complete failure, as a result of any accident, the deformity would remain virtually as at first.

In general, therefore, we have by it much to gain, and comparatively little to lose.

We are always in danger of judging too partially of any method or agent which has happened to serve us well. But, concerning this operation for the treatment of ectropion by transplantation of skin, when we see what satisfactory results have followed its employment in even a few cases, and when we remember, too, the great gains to be obtained, the subject would at least seem to be worthy of more frequent and more prominent mention in ophthalmic literature.

REMARKS.

DR. AGNEW made two suggestions: one was that the flap should be taken from the inside of the arm, and not the forearm, for by so doing there was no scar exposed upon the forearm, which was a matter of considerable importance when operating upon women. Another suggestion was that in performing this operation the scissors should be used instead of the scalpel. Having picked a little hole in the skin with a scalpel, a pair of small probe-pointed scissors should be taken and run around the flap in the same manner as a drygoods clerk runs through a piece of goods upon the counter; this would save a great deal of time. The objection to the scalpel was that in cutting you dipped down at certain points deeper than at others. By means of the probe-pointed scissors you might encircle the flap very quickly, which was a matter of importance wherever skin was to be transplanted, for *time* entered into this operation as an element of success.

DR. KNAPP remarked that in ectropion operations he preferred the scissors, but for plastic operations he preferred the knife on account of its pressing less upon the tissues.

DR. NOYES gave the result of his experience with the treatment of ectropion by transplantation. He had had three cases: in one the operation resulted successfully, in two it was a failure. One failure was due to the fact that the flap was not sufficiently secured. In designating this operation it had been suggested to his mind that a special name should be used, and he had spoken of it as the operation "by transportation." In children he had not found the arm a suitable region from which to take the skin; he had found the side of the

he most satisfactory locality. In regard to little details he
ıv it was desirable to have a pattern the shape of the flap to
This was best made from a piece of adhesive plaster, which
dhere to the skin. In outlining the piece of skin to be re-
he recommended the use of the scalpel going just deep
to draw blood. The scissors were then to be used, to run
he flap and to remove it, leaving behind the adipose tissue.
ıajority of instances gold-beater's skin was alone used to sup-
flaps; but he had found that the addition of collodion gave
upport. It did not appear that its contraction was in any
jectionable. He remarked that, in the case in which he re-
piece of skin, the flap was two and a half inches by one and
ch. The child was last seen three months after the operation,
e transported piece measured one inch by one-half inch.

). F. WADSWORTH, of Boston, Mass., remarked that he had re-
case of this kind some four or five months after the operation.
time the patient was shown to one of the Boston medical
. The flap then measured precisely the same as it did when
d six or seven weeks after the operation. It was then cold
and when the patient came in from out of doors the flap
little whiter than the surrounding tissue; but the patient
was not the case at other times, and also that the tendency
white was diminishing. Tested with the dividers, the sensi-
s precisely the same on the transplanted piece as on the skin
t.

HARLES J. KIPP remarked that he had performed this opera-
times, twice in the same individuals, and all upon the lower
is operations had not resulted as favorably as would have
sirable. In one the flap sloughed entirely; in another the
l was destroyed by secondary syphilitic disease, and though
days the result was all that could be wished, now the ectro-
s as bad as before the operation.

ADSWORTH remarked that his case occurred in the lower lid.

AGNEW inquired if the use of the adhesive plaster, referred to
Noyes, would not redden the flap when it was removed, and
interfering with its circulation, cause it to die.

NOYES replied that he recommended that it should be applied
g enough to draw the necessary outline.

INTRA-OCULAR LIPÆMIA.

BY DR. ALBERT G. HEYL,

PHILADELPHIA, PA.

LIPÆMIA may be defined as the name applied to a state of the bloo characterized by the presence of free fat in the serum of the blood It may be either a physiological or pathological phenomenon.

1. *A physiological phenomenon.*—As is well known, during th process of digestion the emulsified fat is absorbed both by the lac teals and blood-vessels; reaching the lungs, it is there at first com pletely transformed, so that in the blood from the left side of th heart no trace of it can be found. As digestion proceeds, howeve especially if the food be rich in fat, the transformation in the lungs i incomplete, and free fat may then be found in the general circula tion. In this physiological lipæmia the fat is in a state of fine div sion, and in the lower animals is frequently present in such quantit as to produce a milky hue of the blood. Whether this "milk blood" be ever a normal phenomenon in man, I venture to think an open question.[1]

2. *A pathological phenomenon.*—In certain pathological states the liver and kidneys, in peritonitis, cholera, in old drunkards, th blood has been noticed at times to be of a milky hue, from the larg

[1] This view is contrary to the opinion of so able a physiologist as Profess Dalton (Human Physiology, page 199). He says that the "milky blood" o served in certain cases of apoplexy is a purely physiological phenomenon havi no connection with the cerebral symptoms. Against the statement that it is physiological phenomenon are: 1, that in the immense numbers of ophthalm scopic examinations of healthy eyes which are constantly being made, the peculi appearances of intra-ocular lipæmia would have been seen and described; its peculiar association with diseased conditions, as diabetes mellitus, etc.

With regard to the pathological effect of this milky blood, I think that th much may be accepted: 1, given a healthy circulatory apparatus, the lipæmia w produce no pathological change of note, provided its presence be not constant 2, given an abnormal circulatory apparatus, and the lipæmia may give rise fatty masses occluding the vessels.

of emulsified fat which it contained; especially has it been
connection with diabetes mellitus. Rollo, to whom we owe
xtensive treatise on this disease (London, 1798), noticed it,
then Kussmaul, Virchow, and others have likewise seen in-
f it.

t from this is a form of lipæmia met with in connection
ured bones. It is now a well-established fact that after an
ening the medullary canal of a bone, free fat from the me-
find its way into the blood, fat-emboli may form, and even
ult. In this form of lipæmia the fat is not evenly distrib-
ugh the blood in a finely divided state, but probably exists
rm of colorless globules, for the embolus which may be
erefrom is "a clear, homogeneous, colorless mass."[1]
rms in which free fat is found in the blood may, then, be re-
:

globular form.—In this case the free fat enters the circu-
thout being previously subjected to any preparatory pro-

molecular form.—In this case the fat is emulsified; it enters
lation in a finely divided state, the molecules requiring for
gnition a power of 600 or 700 diameters.

stinction is important, because in the first place there is a
tendency to the formation of fat-emboli. In the second
s doubtful whether the fat would give rise to any abnormal
, provided the circulatory apparatus were in a healthy state.[2]
e purpose of this paper to discuss some points relative to
ar lipæmia, that is to say, the intra-ocular phenomena which
lipæmia.

intra-ocular lipæmia characterized by the presence of fatty
in the intra-ocular circulation. Very little is known about
far as I am aware, its existence in man has never been ob-
There is, however, an interesting and suggestive experiment
y bearing on this subject, which ought to be mentioned. A
of fat was injected into the jugular vein of a dog; the fundus
ye was normal. Twenty-four hours after the injection the
is was marked by numerous retinal hemorrhages; a few
ges were also observed in the retina of the right eye. Two
r this the hemorrhages had increased in number. Here,

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[1] Busch: Fett Embolie, Virchow's Archives, XXXV., p. 321.
[2] See note on previous page.

doubtless, there was intra-ocular lipæmia, fat-embolism, retinal hemorrhage.[1]

2. The form of lipæmia in which the fat is in a molecular or finely divided state. As has already been stated, when the fat is present in sufficient quantity, blood drawn from a blood-vessel is of a milky hue. One would naturally suppose that under such circumstances some abnormal intra-ocular change would be observed, and such, in fact, is the case.

On January 30, 1880, I had the honor to present before the Philadelphia County Medical Society a picture representing the intra-ocular appearances observed by me in a case of diabetes mellitus, whose blood was of this milky hue. The patient was under observation about six weeks. A full history of the case, including results of autopsy, microscopic examinations, etc., has been given by Dr. Louis Starr, in the New York *Medical Record*, May 22, 1880. I can only give a brief abstract.

The patient, Henry W., aged twenty, was admitted to the medical ward of the Protestant Episcopal Hospital, under the care of Dr. Louis Starr, Nov. 8, 1879. On admission he was weak and much emaci-

[1] This experiment is of such interest, that I will give the main points, taken from Czerny's description:

Feldman, ein kräftiger Jagdhund, mass am 23 Januar, 1875, 3½ Nachmittag, in Rectum 39.4 Gr. C. Respiration ruhig—36. Puls, 132. Augengrund normal. Um 4 Uhr—Einspritzungen von 20 Grm. Schweinefett von 40 G. in die Vena Jugularis. Bald darauf, heftiges Bellen, Streckkrämpfe im Rücken, Koth und Urin Entleerung, Unfähigkeit zu stehen. Puls verlangsamt, Respiration sehr beschleunigt. 4½ Uhr.—Die Krämpfe haben nachgelassen. Der Hund liegt bewusstlos. 7 Uhr—Der Hund lauft schon schwankend.

Januar 24, 6½ Uhr früh.—Er frisst und lauft gut, ist aber noch traurig.

Januar 25.—Rechtseitige Pneumonie. Respiration und Puls sehr beschleunigt. Im linken Auge, besonders nach innen oben sieht man mit dem Augenspiegel in der Netzhaut zahlreiche dunkelrothe meist rundliche Haemorrhagien mit lichterem Hof zeerstreut, die sich besonders vom Metallgrünem Tapetum sehr schön abheben. Ihre Grösse wechselt von den kaum sichtbaren bis zum Durchmesser der Papilla. Im rechten Auge sind die Blutpunkte weniger zahlreich.

Januar 27.—Die Haemorrhagien in der Netzhaut sind noch etwas umfangreicher geworden.

Februar 25.—Von den Extravasaten sind nur unbedeutende Spuren zurückgeblieben. Choroidal Epithel in diesen Stellen nicht alterirt. Hund ist gesund. Ich habe unter allen meinen Versuchen blos noch ein zweites Mal bei demselben Thiere solche embolische Haemorrhagien der Netzhaut gesehen während man bei der Obduction von an Fettembolie gestorbenen Thieren sehr häufig ähnliche Haemorrhagien im Gehirn, Herzfleish und Lungen findet.—*Berliner klinische Wochenschrift*, November 1 and 8, 1875.

Investigation showed the case to be one of marked diabetes
is. The patient complained of dimness of sight, and was sent
for examination. The peculiar appearances of the fundus
ted to me that possibly the blood might be leukæmic. To
the question, Dr. F. P. Henry made a count of the blood
ans of Gowers' hæmacytometer, with the following results,
number of red corpuscles to cubic millimetre, 4,205,000,
rmal number being at least 5,000,000; number of white cor-
s to cubic millimetre, 50,000. There was, then, 1 white to 84
rpuscles, the normal relation being 1 white to 350 or 400 red.
gh the red corpuscles were somewhat diminished, the blood
t leukæmic. The blood which was drawn on this occasion, as
at other times, presented a peculiar appearance. On prick-
e finger, a drop of blood would escape, having very much the
of a piece of pink coral, followed by a thick, whitish fluid,
color and consistence of an oil-emulsion. On examining
th a low power, 250 diameters, a few blood-corpuscles could
n upon a dim, misty background, barely discernible. Exami-
with a power of about 600 showed the granular nature of this
round, and examination in various ways left no doubt but that
fat in a finely divided state. I append the report of the oph-
oscopic examination

DR. ALBERT G. HEYL'S REPORT.

patient presented himself for examination on November 11,
Examination with the ophthalmoscope showed that there
pacities in each crystalline lens; the pupils were dilated with
, and it was then found that the nucleus of each lens was
e; the cortical structure, though sufficiently clear for exam-
of the interior of each eye, was traversed by radiating spikes
que lens-tissue.

moment my eye caught the details of the fundus, I saw the
xable appearance which I shall endeavor to describe. The
rance was the same in each eye, and I was able, through the
f Dr. Charles B. Nancrede, to obtain a very accurate painting

fundus was free from any evidence of the existence or pre-
nce of inflammation; the nerve-margin was well defined, the
s were not tortuous; no retinal lesion, no hemorrhagic clots
seen.

The abnormal appearances which attracted attention were:

1. The abnormal color of the blood in the retinal vessels. As is well known, the retinal vessels are, with the exception of the optic papilla, the most striking objects seen in ophthalmoscopic examinations of normal eyes—the arteries being characterized by their small size and yellow-red color, the veins by their large size and dark, cinnabar-red color. In this case, however, the vessels were all apparently of the same color; this color may be described as a light salmon. By color alone, then, the arteries could not be distinguished from the veins. This was the case when the light from the ophthalmoscope was thrown directly on the vessels; by rotating the handle of the mirror so as to deflect the light, a dark axis could be seen in the large venous branches.

2. The apparently large diameter of the vessels; the vessels appeared to have about twice the *normal* calibre.

This curious phenomenon may be explained satisfactorily in this way. When we examine the fundus of an eye we apparently see the full diameter of the vessels; accurately speaking, this is not true. Could we examine the vessels under sufficiently favorable circumstances we would see a column of blood-corpuscles in the axis of the blood-stream, and surrounding this axial current a peripheral current composed of the plasma of the blood. Under ordinary circumstances this peripheral portion of the blood-current is invisible in ophthalmoscopic examinations; it can only be recognized by special search, so that what appears to be the diameter of the vessel is really the diameter of the axial current. Could we easily recognize the peripheral current the retinal vessels would seem to possess about double the calibre seen under ordinary circumstances.

In the case under consideration the serum of the blood was opaque, and therefore visible, by reason of the presence of fat in abnormal amount. Hence, the vessels appeared to possess double the usual calibre.

With regard to the general color of the fundus, the best idea of it may be obtained by taking Fig. 45 of Jaeger's ophthalmoscopic atlas to a well-lighted window, and allowing the sunlight to fall upon it. How much the lipæmia had to do with the general color of the fundus, I cannot say; for the pigment of the fundus was sparse, and the patient, while not an albino, had very light, almost white hair, light irides, etc. Under normal circumstances, of course, the fundus would have been of very light color. The examinations were generally made with an ordinary concave ophthalmoscopic mirror. The

on of the eyes could not very accurately be determined, to the cloudy condition of the lens; it was, however, nearly ropic, perhaps a slight grade of hypermetropia existed. This on, to which the name of *lipæmia retinalis* may be given, is re characterized by the light salmon color of the blood con- in the branches of retinal vein and artery, by the apparently alibre of these vessels, and possibly by the very light color of dus oculi—these appearances being due to the presence of bnormal amount in the serum of the blood.

culiar ophthalmoscopic picture was evidently offered for study case. Extended search having failed to reveal any recorded tion of this condition, I proposed the name of retinal lipæmia as still more accurate, I have adopted the name of intra- lipæmia.

only known intra-ocular change likely to be confounded with e to molecular lipæmia is intra-ocular leukæmia; both very come within the observation of the oculist, and both may be panied with marked color-change of the fundus and the retinal It will be well, therefore, to consider the differential diag- Let it be remembered that we are not about to consider the tial diagnosis of two forms of retinitis, but of two intra- conditions characterized simply in the one case by a lipæmic, ther by a leukæmic state; doubtless retinitis with hemorrhage cur in connection with either condition, but it will not be ered in the following analysis. The problem before us, then, given two eyes with normal circulatory apparatus, in one h the blood is markedly lipæmic, in the other markedly leukæ- distinguish the one from the other. Two points of contrast ttention:

The color of the fundus.—In leukæmia the color is an orange- which does not disappear when the examination is made with ight.[1]

ipæmia the fundus is of a light salmon-red color when exam- ith gaslight; how it would appear if sunlight were used for mination I cannot say from personal observation; probably lex would be mainly white tinged by a shade of pink. The tion is supported by the difference in the macroscopic appear- of lipæmic and leukæmic blood: the former is of a pinkish the latter, in pronounced cases, of the color of pus.

[1] Knapp's Archives, vol. i.

2. *The color of the retinal vessels.*—In leukæmia the veins are pale (Gowers), of a bluish red approaching a rose (Becker), while the arteries are of a pale yellow. In lipæmia arteries can with difficulty be distinguished from veins, and both have nearly the same color as the fundus.

The distinction is marked and is caused by the different light-reflecting power of a mass of white corpuscles and a quantity of molecular fat evenly distributed through the serum.

3. *The apparent size of the retinal vessels.*—In lipæmia the retinal vessels are apparently about double the size of those of a normal eye of the same refraction. This, as has already been explained, is not due to an actual increase in size of the vessels, but to the presence of the molecular fat in the plasma of the blood, thus causing the full width of the vessel to appear.

In leukæmia, all agree that the veins appear unusually large and the arteries very narrow. From actual measurements of a carefully drawn picture of this kind,[1] the following conclusions may be deduced: 1, that the apparent size of the retinal arteries is about equal to those which would be observed were the blood in a normal state; 2, the calibre of the retinal veins is apparently very much increased, so that they appear four times larger than those corresponding arteries, instead of being only one-third larger, as under normal circumstances. The latter change in leukæmia has been ascribed to an atony of the vessel-coat (Gowers[2]).

Allowing, however, this to be the case, there can be little doubt but that some other element enters into the explanation; for in observations of Jaeger[3] on the retinal vessels, in cases of paralysis of the vasa-motor nerves, the arteries were normal in calibre, and the

[1] The measurements of Gowers' picture of intra-ocular leukæmia are as follows: horizontal diameter of disk = 18 mm. Allowing 1.6 mm. as the mean diameter of the disk (Schultze), the picture is magnified 11.25 times. From data derived from a picture by Jaeger (Einstellungen des diop. Apparat.), a vein should have an apparent width of 1.125 mm., and an artery of .75 mm. under a magnifying power of 11.25. But in Gowers' picture the vertical vein has a width of 2 mm., and the artery .5 mm. Therefore, the vein in the leukæmic case was of nearly double the normal width, the artery slightly diminished. Considering, however, the slight inaccuracy which might attend the measurement of the width of a retinal artery, also the possible variation in the width of normal vessels, the statement in the text will, I think, be a fair one.

[2] Medical Ophthalmoscopy, p. 190.

[3] Ergebnisse der Augenspiegel Untersuchung, p. 109. See note at the end of this article.

: the most, showed only an increase of three-fourths the normal whereas, in this case of Gowers, it was about double.

e light of my case of lipæmia, I offer a different explanation; it more intelligible, I will give a brief extract from Cohn- lescription[1] of the normal circulation. After referring to points of difference between arteries, veins, and capillaries, proceeds: "Of special interest is, further, the different ap- e of the peripheral zone in the three kinds of vessels; for *blood* column does not fill the lumen of the artery completely, e remains between it and the inner contour of the vessel- ays an uncolored seam of varying breadth, in which one es a red, and very seldom a white corpuscle, and in which, e, simply plasma flows. Also, in the veins a similar zone is mposed of plasma; but in this, one finds regularly single corpuscles, which move along much slower than the axial of red corpuscles." This difference as regards the absence scles in the peripheral current of the artery, and their pres- that of the vein, is probably due in great measure to the e in rapidity of the two blood-currents.

ve the difference between the arterial and venous blood- in the arterial, the blood-corpuscles keep in the axis of el; in the venous, the white corpuscles get into the peri- yer. Remember now that in ophthalmoscopic examination pears to be the whole width of the vessel is really only the the axial current,[2] and also that in leukæmia the white es are more numerous than in healthy blood, and we can plain the normal size of the artery and enlarged size of the s the arterial blood swiftly passes through the retinal artery, uscles keep in the axis of the stream, and the artery appears ormal size. In the vein, however, the white corpuscles get peripheral current to such an extent as to make it visible; enlarged size.

moreover, conceivable that at times the white corpuscles llect to such a degree in the peripheral layer as to give rise

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eine Pathologie, p. 115.

act deserves more attention than it has received. I will quote Profes- 's description: "Von den Netzhautgefässen sieht man unter physiolo- erhältnisse mittelst des Augenspiegel nur den roth gefärbten Theil der das ganze Gefäss jedoch ist seinem Querdurchmesser nach nahezu dop- larüber so breit als der eingeschlossene sichtbare rothe Blutstrom." e der Augenspgl. Untersuchung, p. 46.)

to a whitish margin to the vessels. The acute observations of Becke have taught us that this actually occurs in retinitis leucæmica. It i figured in his picture of this disease. A vessel is pictured markedl tortuous; close to the tortuosity the whitish edges of the vessel ar seen—due, in my opinion, to the collection of corpuscles in the peri pheral current of the blood-stream. As the vein approaches th disk its course is straighter, and the whitish margin is absent, becaus the current has regained sufficient speed to bring back into the axi of the vessel some, at least, of the white corpuscles. It is but righ to say that Becker's explanation is that the whitish margin is cause by the diapedesis of the corpuscles through the vessel-coats; but th fact that this peculiar appearance was noticed only at the tortuou portion of one vessel, and was absent in all the others, is against thi hypothesis.

One point more may be mentioned, viz., the flattened appear ance of the retinal veins which has been noticed in leukæmia. Th same appearance was seen in my case of lipæmia. The phenc menon is due, in my opinion, not to an actual flattening the resul of intra-ocular pressure upon an atonic vein, but to the anatomica shape of the normal retinal vein.[1] The cross-section of a retina vein is an ellipse, the major action of which may be considered a lying in the retina perpendicular to a line drawn from it to the centr of rotation of the eye. To put it in other words, when we examin a retinal vein with the ophthalmoscope, the curve of the vesse turned toward the observer's eye is not the curve of a cylinder, bu of a cylindroid, *i.e.*, a body like a cylinder, but having for its base a ellipse instead of a circle.

So long as the blood-current is composed of the ordinary ingre dients, and the axis of the current appears only to the examiner, n very striking flattening of the blood-stream would be observed. Le however, the peripheral layer of the blood-current become visibl and the broad side of an elliptical curve will appear to the eye Thus may be explained the apparent flattening of the retinal vein in lipæmia and leukæmia.

Let us now turn our attention to an entirely different point of th subject, viz.: Can this intra-ocular lipæmia produce any disease c the structures of the eye?

From what has been said in this paper already, we have learne

[1] Schneller: Zur Lehre von der Ernährung der Netzhaut. Graefe's Archi Bd. XXVI., 1, S. 72.

hen globular intra-ocular lipæmia exists, we may have exten-
tinal hemorrhage, the result of fat-embolism. The observa-
Czerny is important in its bearing upon the subject of intra-
embolism. Upon this matter the limits of this paper forbid
say more.

h regard to the pathological effect of intra-ocular lipæmia of
olecular form, I wish to say a few words. I shall confine my-
mply to the condition as manifested in diabetes mellitus, be-
the case referred to already had this disease; and further,
es mellitus is accompanied by certain well-known extra-ocular
ications, which will serve to make my meaning plain.

betes mellitus in its later stages is frequently characterized by
rmation of boils, carbuncles, gangrene of the lung, and gan-
of the extremities. These phenomena may be explained as
caused by the abnormal character of the blood, in conse-
e of which the nutrition of certain tissues dies. This explana-
so indefinite that it is unsatisfactory; it gives no clue as to the
operandi. The following explanation I offer with diffidence,
se there are many who can speak on this subject with far
authority and knowledge than I can claim. I only suggest
use it offers, in my opinion, a solid base upon which to rest
pothesis for the causation of the cataract and retinitis of dia-
mellitus.

erve, then:

That all the extra-ocular complications named have this com-
eature, viz., the necrosis of tissue.

That this necrosis of tissue doubtless is the result of interrupt-
culation.

That this interruption of circulation may be caused by occlud-
asses of fat, for in diabetes mellitus the "blood, *as a rule*,
ns a larger amount of fat than usual,"[1] and in my own and
rs'[2] cases of lipæmia masses of fat were found occluding the
s.

ring these points in mind, consider the peculiar character of
ic retinitis: it is hemorrhagic, sometimes simple retinal hem-
ge is discovered, at other times hemorrhagic retinitis such as
in cardiac disease; quite noticeable is also the frequency of
us cloudiness, "in all probability of hemorrhagic origin,"

[1] nolds's System of Medicine, vol. v., art. Diabetes Mellitus, by Brunton.
[2] æmia in Diabetes and Fat-Embolism. Sanders and Hamilton, Edinburgh
ournal, July, 1879.

(Leber). Recalling Leber's hypothesis[1] of the embolic origin of many cases of hemorrhagic retinitis, I have come to the conclusion that the diabetic retinitis is a hemorrhagic retinitis, caused by occluding masses, probably of fat, occluding the capillaries or minute vessels. If we look, then, simply at the immediate cause, we may classify the diabetic retinitis with the extra-ocular complications which have been mentioned. Though it be that in the latter we have necrosis of tissue and in the former not, that is a mere accidental difference; this is proved by the well-known fact that embolism of the central artery (a terminal artery) does not lead to necrosis of tissue.

Now, if the above reasoning be true, we may further inquire whether the diabetic cataract may not likewise be caused by the occlusion of some of the intra-ocular vessels; whether, in other words, the cause which I have offered for the other complications of diabetes previously mentioned may not originate this one.

The connection between diabetes and cataract, as is well known, has no satisfactory explanation. The hypotheses which have attracted most attention are those which point to some abnormal constituents of the humors about the lens; but they need to be braced by much stronger facts than investigation has yet produced, to keep them from crumbling to pieces.

Beyond question, any hypothesis respecting the causation of a complication of a disease has presumption in its favor when it fairly explains other complications of the same disease; also, the larger the number of complications thus explained, the stronger the presumption in favor of the hypothesis.

I conclude, then, that I have presumption in favor of fatty obstructing masses in the intra-ocular blood-vessels as a cause of diabetic cataract, provided there exists reasonable ground for supposing that such a cause could produce cataract at all.

Observe that the question essentially involved in this proviso does not necessarily involve the method by which the lens is immediately nourished; this problem is as yet unsolved. The question is this: Can an abnormal state of any part of the intra-ocular vascular system be the cause of cataract? I think so: 1, on the general ground that the nutrition of all tissues is derived eventually from the neighboring blood-vessels; obstruct these blood-vessels sufficiently, and the nu-

[1] Graefe und Saemisch, Bd. V., Th. v., S. 570. Also vide Michel: Deutsches Archiv f. klin. Med., XXII., 43.

f the tissue must suffer; 2, the cataract of ergotism[1] may
ply be ascribed to a pathological state of the intra-ocular
and it is quite possible that other instances could be added,
e etiology of cataract not involved in so much obscurity.

I have offered a hypothesis to explain the retinitis and
of diabetes mellitus. As to the method of formation of the
es spoken of, much cannot be accurately said. It is true that
ject of fat-embolism has attracted considerable attention,
investigations, clinical or experimental, bear almost alto-
pon what I have called in this paper globular lipæmia; in
, naturally, the globules of oil would occlude the capillaries
er arteries, even when the circulatory apparatus is in good
n. In the molecular form we must conclude, from physio-
henomena, that there is no special tendency to the formation
obstructing masses; that is to say, given a normal state of
rt and vessels, a normal state of the blood, excepting the
e of molecular fat, and it is in the highest degree probable
obstructing masses of fat would form. That these obstruc-
y form, however, in certain *pathological* states of the system,
eem to have been demonstrated.

e thus spoken guardedly on this subject because there are
oints connected with it involved in an obscurity which the
future investigation alone can dispel. I am conscious that
othesis is open to assault—not, however, I believe, from in-
weakness, but from the lack of certain data which, in the
state of the science, cannot be obtained. I offer it with the
at they to whom the rare opportunity of examining micro-
ly the diseased eyes of diabetic patients is given, may have
ention drawn to a line of investigation which may lead to

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r raises a doubt as to the connection between ergotism and cataract.
nd Saemisch Handbch., page 226, vol. v., part V.)
servations of Meyer are said not to afford very convincing proof of any
n between the ergotism and cataract, and also not to have been estab-
the observation of others. Observe, however, that ergotism is practi-
an unknown condition, and thus no opportunity is offered at present for
ts clinical relations; also it does not appear from Meyer's description
ataract developed with extreme rapidity; it was months after the attack
m that patients presented themselves for treatment of defective sight: it
fore be easily seen why Meyer's observations have received so little cor-
n. The strongest point in Meyer's observations seems to me to be the
that, in a collection of between two and three hundred people attacked
lisease, more than twenty presented themselves with cataract.

the clearer conception of the obscure manifestations of an obscu disease.

NOTE.—The observations of Jaeger, since my article was sent in for publicatio in the "Transactions," have appeared to me not quite pertinent to the subject atony of the retinal veins, for the retinal veins are peculiar in that they a destitute of a muscular coat. The *primary* effect of vaso-motor paralysis on structure of this kind would be nothing.

Nevertheless, the position which I have taken with regard to Gowers's explan tion is, I believe, correct; for it is difficult to understand how the retinal vei composed of outer connective-tissue coat and inner one of endothelium, can b come atonic, and furthermore, doubtless the retinal veins under normal circu stances are quite flaccid.

REMARKS.

DR. KNAPP said that he had recently seen two cases of retinit diabetica. One case, a cataract patient upon whom he had ope ated a year ago, showed a well-marked neuro-retinitis. In the oth case the patient, a woman, suddenly became blind in one eye, an presented the symptoms of embolism. A few days later the pictu of embolism was still more pronounced. There was a milky a pearance of the retina, largely dilated dark veins, and the fove centralis of the yellow spot was cherry-red. In about five days began to clear up, and the vision improved to $\frac{1}{200}$. The retinal ve sels shrank then to a minimum and the disk was white. Sight total lost. This condition was followed by iritis, and a most painful gla coma, on account of which I removed the eye. The patient's healt improved. The other eye was carefully watched, but never showe any abnormity, the fundus in particular being normal.

DR. JOHN GREEN thought the position taken by Dr. Heyl, in r gard to the appearance of the size of the vessels, was untenable.

DR. HEYL wished simply to say in reply that the position whic he had taken was the one Prof. Jaeger had laid down (vide Note p. 61. Dr. Heyl's paper), and he would state further that repeated he had been able to detect this same appearance.

DR. JOHN GREEN reiterated his belief that it was impossible f so large a portion of the lumen of the canal to be occupied by tran parent blood while only a small portion of it was occupied by re blood.

DR. HEYL said in reply that he was not aware of the existence this condition of things before he read Prof. Jaeger's observations he thought, however, that they were true. Where two vesse crossed you could often see a faint line indicating a distinct spac which was filled in by the transparent peripheral layer of plasma, s that the whole width of the vessel would be about double the widt of the red-blood current.

ULAR REPORT EXHIBITING THE POSITION OF E AXIS OF THE CYLINDER IN SIMPLE, COM-UND, AND MIXED ASTIGMATISM; THE MYOPIC D HYPERMETROPIC FORM COMPARED. WITH MARKS.

By DR. W. S. LITTLE,

PHILADELPHIA, PA.

E taken in succession from my note-book 225 cases of re-nvolving astigmatism, and tabulated them; so as to exhibit pare the frequency of the position of the principal emme-eridian in myopic and hypermetropic astigmatism; the ta-not presented, the result being stated.

tatement of authorities that, in Am., it is at 180°, or hori-nd in Ah. at 90°, or vertical, is soon observed in the cor-f simple As.; but I desired to investigate if the same held rrection of compound and mixed astigmatism.

cases might have been quoted, but sufficient are presented, t the point investigated. Other points in regard to refrac-stated that may be interesting, which were brought out by od adopted in arranging the tables. One-sixtieth ($\frac{1}{60}$) of e lowest correction. All were corrected under a mydri-pia, or duboisia, and full vision obtained, save where a transparency or amblyopia prevented.

25 cases of astigmatism, were divided as follows :

As. 102 cases, or 45½ per cent., divided as follows :

Am. 40 cases, or 39½ per cent.

Ah. 62 cases, or 60½ per cent.

ound As. 114 cases, or 50 per cent., divided as follows :

Am. 57 cases, or 50 per cent.

Ah. 57 cases, or 50 per cent.

As. 9 cases, or 4½ per cent., divided as follows, and count es :

Am. 9 cases, or 50 per cent.

Ah. 9 cases, or 50 per cent.

Total, Am. 106 cases, or 45 per cent.

Total, Ah. 128 cases, or 55 per cent.

Eyes affected : O. U. 142
O. D. 43
O. S. 49
234
less 9 mixed, counted as 18 cases, as follows

Simple As. 102 cases :		Compound As. 114 cases :	
Am. O. U. 23	Ah. O. U. 41	Am. O. U. 39	Ah. O. U. 3
O. D. 8	O. D. 8	O. D. 10	O. D. 1
O. S. 9	O. S. 13	O. S. 8	O. S. 1

Mixed As. 18 cases :

Am. O. U. 3	Ah. O. U. 3
O. D. 2	O. D. 2
O. S. 4	O. S. 4

Total, Am..... 106
Ah..... 128

The 225 cases involved 450 eyes examined ; of these, 365 ey
are exhibited with As., or 78 per cent. :
O. D. 182
O. S. 183

The 103 eyes remaining were affected with E., M., H., or A
less than $\frac{1}{60}$, opacities, diseases, or injuries, and are exhibited in t
tables and amount to 22 per cent. :
O. D. 52
O. S. 51
Total..... 468
less 18 mixed As.
450 eyes.

Table A exhibited simple astigmatism.
Table B exhibited compound astigmatism.
Table C exhibited mixed astigmatism.
Table D exhibited all combined.
Table E exhibited the number of eyes equal or unequal in refra
tion in a given case :
also the degree and axis of those equal ;
also the degree of those equal ;
also the axis of those equal ;
also the eyes unequally affected ;
also the condition in compound As. with
and H.

1 exhibited the degree and axis in the number and order of frequency in Am. and Ah.
2 exhibited the axes in the number and order of frequency in Am. and Ah.
3 exhibited eyes affected in Am. and Ah.
4 exhibited recapitulation of results.

5 cases, or 78 per cent., affected with As. are divided as

A exhibited: Simple As. 161 cases, or 44 per cent. :
O. D. 83 ; O. S. 78.
Am. O. D. 31 ; O. S. 31, or 38 per cent.
Ah. O. D. 52 ; O. S. 47, or 62 per cent.

B exhibited: Compound As. 180 cases, or 49½ per cent. :
O. D. 85 ; O. S. 95.
Am. O. D. 44 ; O. S. 51, or 52 per cent.
Ah. O. D. 41 ; O. S. 44, or 48 per cent.
d H. corrected, I took As. as if Simple As. existed.)

C exhibited: Mixed As. 24 cases, or 6½ per cent.
O. D. 14 ; O. S. 10.
Am. O. D. 7 ; O. S. 5, or 50 per cent.
Ah. O. D. 7 : O. S. 5, or 50 per cent.
bicylindrical lens was required in these cases, they count as —12 for Am. and 12 for Ah.)

D exhibited: The cases are collected as if all were Simple As. and Am. and Ah., and O. D. and O. S. compared as to their degree and axis.

Analysis and Comparison as to the Frequency of the Position of the Axis in Am. and Ah.

A exhibited—Simple As. :

Am. 50 per cent. at 180°, or horizontal.
20 per cent. at 90°, or vertical.
5 per cent. at 45°, or oblique.
25 per cent. at other points.

Ah. 54 per cent. at 90°, or vertical.
14 per cent. at 180°, or horizontal.
7 per cent. at 135°, or oblique.
25 per cent. at other points.

Table B exhibited—Compound As.:

Am. 33⅓ per cent. at 180°, or horizontal.
25 per cent. at 90°, or vertical.
11 per cent. at 135°, or oblique.
30 per cent. at other points.

Ah. 60 per cent. at 90°, or vertical.
17 per cent. at 180°, or horizontal.
5 per cent. at 45°, or oblique.
18 per cent. at other points.

Table C exhibited—Mixed As.:

Am. 75 per cent. at 180°, or horizontal.
25 per cent. near 180°, or horizontal.

Ah. 92 per cent. between 45° and 135°, vertical.
8 per cent. at 180°, horizontal.

Table D. exhibited General As., all the cases united with As.:

Am., 42 per cent. at 180°, or horizontal.
23 per cent. at 90°, or vertical.
35 per cent. at other points.

Ah., 54 per cent. at 90°, or vertical.
8 per cent. at 180°, or horizontal.
38 per cent. at other points.

Thus, Am. exceeds at 180°, or horizontal.
Ah. exceeds at 90°, or vertical.
Am., 42 per cent. at 180°.
Ah., 54 per cent. at 90°.

As to the eyes in the 365 cases equal and unequal in refraction in degree and axis in O. U. and O. D. and O. S.:

Table E. exhibited—O. U. equal, 56 cases, or 24 per cent. in degree and axis.
O. U. equal, 19 cases, or 6 per cent. in degree.
O. U. equal, 39 cases, or 17 per cent. in axis.
O. U. unequal, 120 cases, or 53 per cent.
O. D. unequal, 120 cases.
O. S. unequal, 120 cases.

Total..... 234
less 9 mixed As.

225

Table E. also exhibited in what degree and axis O. U. were equal; also in what degree; also in what axis.

Table E. also exhibited how, in Compound As., O. U. were equal:

(57 cases in all.)	M ⊂ Am. and axis.....	4 cases.
	M ⊂ Am.....	3 "
	M.....	27 "
	Total.....	34

(57 cases in all.)	H ⊂ Ah. and axis.....	10 cases.
	H ⊂ Ah.....	3 "
	H.....	10 "
	Total.....	23

Compound Myopic As. exceeds.

Table 1 exhibited the order and number of degrees and axis in O. D. and O. S. in the 365 cases in Am. and Ah. compared:

O. D. 85; O. S. 91.

Am., O. D. 39; O. S. 48.
Ah., O. D. 46; O. S. 43.

O. D. exceeds in Ah.
O. S. exceeds in Am.

Table 1 exhibited number of degrees for O. U., O. D. and O. S. in Am. and Ah.:

O. U., Am. and Ah..... 18

O. U., Am..... 16
O. U., Ah 16

Am., O. D. 17; O. S. 20.
Ah., O. D. 21; O. S. 19.

O. D. exceeds for Ah.
O. S. exceeds for Am.

Table 1 also exhibited the number of axis for O. U., O. D., and O. S. in Am. and Ah.:

O. U., Am. and Ah..... 30

O. U., Am..... 24
O. U., Ah..... 20

Am., O. D. 15; O. S. 20.
Ah., O. D. 19; O. S. 17.

O. D. exceeds for Ah.
O. S. exceeds for Am.

In the proportion of Am. 106; Ah. 128.
O. D. 182; O. S. 183.

O. D. is more frequently affected in Ah.
O. S. is more frequently affected in Am.

As existing in O. D. 182, O. S. 183, shows that As. exists almost equally in each eye.

The 103 eyes, or 22 per cent., not counted with the 365 eyes, or 78 per cent., to make up the 450 eyes (or the 225 cases), were thus affected:

With other optical defects..... 86 cases, or 17 per cent.
With injuries and disease..... 17 cases, or 5 per cent.

		O. D.	O. S.
Refraction: E.—O. U. 14,	Am.,	3	2
	Ah.,	4	5
M.—O. U. 13,	Am.,	8	3
	Ah.,	2	0
H.—O. U. 26,	Am.,	2	1
	Ah.,	14	9
Am.—O. U. 7,	Am.,	1	1
	Ah.,	3	2
Ah.—O. U. 3,	Am.,	1	0
	Ah.,	0	2
Compound As.: O. U. 16,	Am.,	2	5
	Ah.,	3	6
Mixed As.: O. U. 7,	Am.,	2	0
	Ah.,	1	4
		O. D.	O. S.
Total.....		46	40=86

Diseases and injuries:

		O. D.	O. S.
Opacity Cornea, O. U. 5,	Am.,	3	2
	Ah.,	0	0
Opacity Vitreous, O. U. 2,	Am.,	0	1
	Ah.,	0	1
Opacity Crystalline Lens, O. U. 3,	Am.,	0	2
	Ah.,	1	0
Retinitis, O. U. 1,	Am.,	0	1
	Ah.,	0	0
Injury, O. U. 4,	Am.,	2	1
	Ah..	0	1
Enucleation, O. U. 2,	Am.,	0	0
	Ah.,	0	2
		O. D.	O. S.
Total.....		6	11=17

The O. D. exceeded in different optical defects.
The O. S. more subject to disease.

Adding the 365 eyes with astigmatic defects,
and the 103 eyes with other defects, etc.,

468 results;
18 deducted for excess in Mixed As.,

450 eyes remain, belonging to
225 cases studied.

I offer the foregoing cases, as a carefully investigated list of astigmatic defects, with their correction and comparison. Does the frequency of the position of the principal emmetropic meridian in myopic astigmatism, at a horizontal position, and that of hypermetropic astigmatism, at a vertical position, help us to elucidate the cause of astigmatism? I would be glad to answer, that it did absolutely. The study of these cases helps to render more plausible, a line of thought that has occurred to me in seeking for the cause of astigmatism. Solving the cause of normal astigmatism will render the abnormal explained—having a relation to emmetropia, it bears the same to ametropia; the tables also show, the same relation in all forms of abnormal astigmatism; M. and H. in compound astigmatism having no effect on its prevalence or position.

The average position of the maximum and minimum of curvature of the cornea in emmetropia or normal astigmatism, giving a shorter focal distance in the vertical than in the horizontal meridian, is fully appreciated; but the reason of this, and why, when it varies from this, is the point, when fully explained, that will give the cause of astigmatism normal and abnormal. The cause that gives the position of the principal emmetropic meridian is the one to solve. The form of astigmatism is to be accounted for by the amount of tissue in an eye, below or above the normal eye, subject to a given influence, the same as decides the form of M. or H. The degree of astigmatism depends on how much the form varies in excess or how much diminished from the normal-tissued eye. The axis depends on what causes astigmatism. Cannot the cause of the difference in the curvature of the meridians of the cornea, making the eye assume an asymmetrical form; normal or abnormal; be sought for, in the relation of the position of the axis of the porous opticus and even the pupil, to the axis of the cornea or ciliary body, with the resultant force expended by the tunica uvea or vasculosa, in its entirety on its point of attachment to the cornea, at the canal of Schlemm? A short anatomical study of two tissues of the eye will help me to explain. One, giving the eye its form; the dural sheath of the nerve, the sclera and cornea as one; the other, the active and passive muscular tissue, the tunica vasculosa, in its entirety of choroid, ciliary body, and iris.

The one tunic, hard and dense giving the eye its form, having its origin in the dura mater of the optic canal, coming forward and expanding itself, according to the underlying tissues, and inserting itself in itself, at the anterior pole of the eye; the weakest point in this tissue being at the porous opticus and the weaker at the canal of Schlemm, or base of cornea.

The other tunic, underlying the one described, having its origin of muscular elements around the porous opticus, and even interlocking through it, forms a sphincter muscle at this point; held in place by the retina and vitreous body as it expands meridionally; till it is attached anteriorly in the canal of Schlemm at the base of the cornea, where another sphincter muscle is formed. Then the tissue falls dependent, unsupported, and inserts itself in itself, in a sphincter muscle, the third in the series, so that the whole tissue is composed of three sphincter muscles, connected by radiating fibres dividing it into two portions, the anterior the smaller, and the posterior the larger.

Now, these three sphincters differ in the position of their axes.

The posterior one lies about four millimetres medially and little below the central one ; the central one lies in the axis of the cornea, or nearly so. The anterior lies not centred, but medially and below, like the posterior one. I prefer to consider the axis of the porous opticus and pupil as one, or lying in the same plane, as far as muscular action is concerned, and not crossing the axis of the ciliary body. I believe the same result ensues as if you consider the axis of the porous opticus and the axis of the pupil crossing the corneal axis at their proper positions, or the influence of the anterior sphincter on the central one can be thrown aside ; but it is better to be retained. If all these sphincters were around the same axis, and the same muscular force as they possess present, any muscular effort, active or passive, would expend itself equally and evenly around the axis at the weakest or weaker point, and no difference in sphericity would occur. Not lying in the same plane, or around a common axis, an uneven force is exerted, and an uneven or asymmetrical result follows active or passive muscular action. Two axes exist : the central axis of the cornea or ciliary body as one, and the axis of the porous opticus and pupil as the other, so that the hour-glass contraction of the ciliary body pulling in active or passive muscular action on the sphincter on either side, especially the posterior, exerts an uneven force which spends itself on the attachment of the muscular tissue to the cornea or canal of Schlemm, and an elliptical shape is given to the cornea in the normal-tissued eye, by which, in emmetropic vision, normal astigmatism results.

The normal position of the porous opticus in a normal-tissued eye will place the maximum of curvature to coincide with the vertical, and the minimum of curvature of the cornea with the horizontal meridian. When this varies in emmetropia, the position of the porous opticus must vary.

The relation of the position of the axis of the porous opticus and pupil to the axis of the ciliary body or cornea, with the resultant force expended by the tunica uvea or vasculosa on its attachment to the cornea or canal of Schlemm, can be considered as the cause of normal astigmatism.

This tension on the cornea exists in the fœtus in its development, and is constant after birth. In abnormal astigmatism, does not the same hold in reference to the axis ; the form and degree, depending on the excess or diminution of tissue, and how much, from what occurs in emmetropia ?

In M. and H. the position of the nerve differs from E.—in M.

farther removed, in H. nearer than in E., and does not the same hold good of Am. and Ah.? So that, in the average position of the axis of the disk in Am., emmetropia stands at 180°, or horizontal, and in Ah. at 90°, or vertical; and when this varies, it is due to a variation in the position of the axis of the porous opticus; as the tables show the possibility for all positions of the axis of the lens, correcting the defect in Am. and Ah. A diseased condition of the tissues could produce the same result.

I regret to have no measurements to offer, in reference to the relative position of the axis of the ciliary body or cornea, and the axis of the porous opticus and pupil, to support what I have expressed in reference to the cause of astigmatism. The uniformity exhibited in the tables in all forms of astigmatism, has encouraged me to say what I have, and which the anatomy of the eye helps to support.

REPORT OF A CASE OF TRAUMATIC PARALYSIS OF THE SUPERIOR OBLIQUE MUSCLE, WITH TREATMENT.

By DR. W. S. LITTLE,

PHILADELPHIA, PA.

NOVEMBER 24, 1877, I was requested to examine the eyes of a lady, fifty-seven years of age, who had fallen down-stairs two days before and was found in an unconscious condition at the foot of the stairs, shortly after the accident; she had fallen on the right side of the head and body. Consciousness was rapidly regained; she could give no account of how it occurred; the stairway was dark and turned at right angles half way down, and some dozen steps in all. Some incoherency lasted for a few hours, and the next morning, on awaking, she saw double, and her physician observed the right pupil larger than the left. I saw her the second day, and found the following conditions affecting the eyes, after making a general examination.

There was no paralysis of motion or sensation in the arms or limbs, only soreness on the right side, upon which she had fallen. No deflection of the tongue, no loss of sense of taste or smell, no nausea or vomiting; some headache. The patient was examined while lying in bed; the condition of the eyes was found as follows: pupil

of the right eye partially dilated, about 6 mm.; the left pupil normal, 4 mm. Ophthalmoscope revealed myopia of both eyes, fundus of both eyes normal; field of vision in both eyes full.

Making fixation with both eyes at an object, held in the horizontal median line, the right eye deviated upward and inward slightly; on closing the left eye, the right made a movement downward and outward. Testing the movement of the left eye, found it normal; in the right eye, however, downward and inward, a less mobility; moving from below upward to the nasal side, it gave a jump.

Testing the field of vision with a candle for both eyes, found double vision below the horizontal line, single above it; standing 10 feet from the patient, in the median line, the images below the horizontal line were homonymous—at 10 feet they were 12 inches apart; and one, the right, 3 inches below the other; this one appeared larger and nearer, and inclined outward at the top; as the candle was moved toward the left the difference in height increased, also the inclination. All objects about the room, below the horizontal line, were doubled and obliquely placed, and not overlapping. From the presence of these symptoms, paralysis of the superior oblique of the right eye was diagnosed. The cause was either central, and the patient affected with an apoplexy at the time of the fall; or else, as a result of the fall, the fourth nerve, coming through the sphenoidal fissure, had been injured by pressure between the bones, or an effusion had taken place about the nerve in its course through the orbit, or the muscle had been injured at its origin. Any central cause was excluded from the slight cerebral derangement and absence of distal loss of sensation or motion, and I was inclined to the belief of traumatism of the nerve; it lying uppermost in the fissure, could be injured by pressure from the bones lying on either side of it. The symptoms given by Wells, p. 561, as involving the superior oblique, were all present.

I gave a favorable prognosis as to the cerebral affection, and was requested to endeavor to relieve the double vision, which was very annoying. Ordered potass. iodid., gr. v., t. d.

December 1st.—At 10 feet the images were 9 inches apart, the right 3 inches lower; ordered the potass. iod., grs. x., t. d.

December 8th.—At 10 feet the images were 9 inches apart, the right 4 or 5 inches below and inclined. I kept the right eye covered, so as to avoid the double vision, and advised either wearing a shade or ground glass before the right eye, to which the patient objected, as she felt well and able to go about; and as I had found on my

first visit a prism of 20°, base down and out, centre of apex of prism at 20° united the images, she desired to obtain this prism. The optician, like the books, objected to its utility.

December 19th.—It was obtained; a plain glass used for the left eye, and single vision resulted. The oblique muscles stand the effect of stronger prisms than the recti muscles.

December 25th.—Wearing prism with comfort; still taking the iodide of potassium. Find pupil right eye smaller.

December 29th.—One month and four days after injury, used Faradic current to superior oblique as best I could. Objects that were formerly separated and oblique began to overlap one-quarter, after its use.

January 16, 1878.—Find the right image moved nearly to median line, and then recedes.

January 23d.—Used eserine to bring down pupil, with good effect.

February 8th.—Prism 17° unites candles. She wore with her prism the concave glasses that she had used for years, for distance.

February 21st.—Prism 17°, centre of apex at 20°, obtained, and worn with comfort.

February 23d.—Without prism, saw my face single while I stooped to pick something from the floor; it was only momentary, and double vision ensued again.

February 28th.—After battery, without prism, can hold objects single for five minutes.

March 2d.—Obtained prism 15°, same position.

March 6th.—Without prism, at 3 feet below horizontal line, objects single for five minutes.

March 18th.—Prism 15° annoyed her.

March 24th.—Prism 10° worn.

April 3d.—Without prism, at 20 feet, objects single below horizontal median line, patient standing, candles on floor, images unite and go off to 3 inches.

April 13th.—Prism 5°, same axis.

April 17th.—Without prism, held object single for long time; constantly single to one foot below horizontal line.

May 8th.—Prism 3° used.

June 11th.—Without prism, patient standing at 40 feet, image single to 3 inches from floor.

June 24th.—Marked improvement at 10 feet in horizontal and median line, object single; 45° from median line to right, single; 45° from median line to left, 4 inches apart.

September 9th.—At 20 feet, without prism, candle on floor, 1½ inch apart; right 3 inches lower and nearer, and inclined; advised to go without prism, and only use concave glasses; right pupil nearly normal.

September 19th.—At 40 feet, image single, without prism; at 20 feet, 3 inches apart, come and go.

September 27th.—18 inches from floor, 6 feet from patient, images 3 inches apart; sent to sea-side.

October 25th.—Sees single at 20 feet, candle on floor, patient standing, no prism. Renew potass. iodid., which had been stopped for long time.

December 23, 1878.—One year from accident. At 5 feet from patient, single to 28 inches from floor, no prism.

January 6th to January 25, 1879.—Gave strychnia, $\frac{1}{30}$ gr., t. d.; constitutional effect.

March 19th.—Gave full correction for compound myopic astigmatism:

O. D.—8 ⌒—48 cyl. ax. 90° $\frac{20}{xx}$.

O. S.—8 ⌒—48 cyl. ax. 45° $\frac{20}{xx}$.

With this correction, objects single, pupil about normal, larger at times; with the slightest inclination of head forward, reads and sews with ease. Uses prism 3° when walking or using eyes for long time.

September 26, 1878.—Works without prism; candle single at 20 feet on floor.

March 17, 1880.—General health good; goes with or without prism 3°. At 17 feet candles come and go slightly, but under control; pupil O. D. slightly larger than O. S.; no treatment; reads and sews without trouble.

I applied the battery one hundred and nine times from December 29, 1877, to December 28, 1879, but principally during 1878.

Took potass. iodid. from December 24, 1877, off and on, for six months, with occasional tonics; used strychnia one year after accident, and pushed till constitutional effect was reached.

The prisms were changed as follows, and six were used, beginning:

December 19, 1878.....	20°	centre	apex, 20°.
February 21, 1878.....	17°	"	"
March 2, 1878.....	15°	"	"
March 24, 1878.....	10°	"	"
April 13, 1878.....	5°	"	"
May 8, 1878.....	3°	"	"

I have them with me for your inspection, except the prism of 3°, retained for use by the patient.

The details of treatment, as I have taken them from my note-book, may be interesting to you, as the rarity of this muscle being affected gives little opportunity for observation or treatment. Though the paralysis in this case was not permanent, strong prisms could be as well worn in a case where the paralysis was complete.

The dilatation of the pupil was interesting to observe in all its stages. The presence of filaments from the carotid plexus of the sympathetic in the fourth nerve, and its occasional blending with the ophthalmic division of the fifth nerve and its recurrent branch to the lateral sinus, are known to exist, and no doubt these were affected along with the proper filaments of the nerve, and the dilatation ensued. Of course this cannot be absolutely asserted; the restoration of function of the muscle and the contraction of the iris later makes it probable.

REPORT OF A CASE OF PARTIAL PARALYSIS OF THE INFERIOR OBLIQUE, WITH TREATMENT.

By DR. W. S. LITTLE,

PHILADELPHIA, PA.

From inability to procure a proper reading-glass, a lady, fifty years of age, consulted me during September, 1877, stating also, she experienced difficulty with opera-glasses, and never could use a stereoscope as other persons.

O. D. V. $=\frac{20}{xx}$ As. slight; no mydriatic.

O. S. V. $=\frac{20}{xx}$ As. more marked.

Ophthalmoscope revealed the right optic nerve, more whitish than the left.

I ordered a + 12 focal for near work.

September 13, 1879.—Two years subsequently I saw her again, as she had fallen three days in succession, on the street, while crossing the railway tracks, and once came near being run over; she had also fallen at home while coming down-stairs; she discovered that double vision was the cause of her mishaps, and it had increased of late. General health was good, pupils were normal.

Her optical defect was corrected under duboisia, and

O. D. V. $=\frac{20}{xl}+48$ V. $=\frac{20}{xx}$.

O. S. V. $=\frac{20}{lxx}+42 \supset -60$ cyl. ax. $45° = \frac{20}{xx}$.

While under the mydriatic and afterward, O. D. A prism of 6°, base upward and outward, with centre of base at 150°, united the double images, and a partial paralysis of the inferior oblique existed. Her falls were always while coming down-stairs or crossing places requiring an inclination of the head, downward and forward.

The position of both eyes was apparently normal; on rotation of the right eye, from above inward, it gave a jump, down and outward.

The diplopia was above the horizontal line and homonymous, the images 6 inches apart, and one, the right, 2 inches higher than the left.

The prism of 6° base upward and outward. Centre of base of prism at 150° united these images placed before the right eye.

A combination of the far and near glasses was used with comfort.

Far: O. D. + 48 $\supset$ prism 6° base upward and outward, centre of base at 150°.

O. S. + 42 $\supset$ −60 cyl. ax. 45°.

Near: O. D + 10 $\supset$ prism 6° base upward and outward, centre of base at 150°.

O. S. + 10 $\supset$ −60 cyl. ax. 45°.

I saw the patient lately; she remains dependent on them, and thought she might need a stronger prism, rather than a weaker one.

The cause of the partial paralysis in this case is unaccounted for. There may be some cause of irritation in the orbit, affecting the branch of the third nerve going to the muscle, or the muscle itself irritated, or else a central source of irritation to the cells controlling the filaments of the nerve going to the inferior oblique.

I have seen lately a case having an apoplexy, with diplopia, where a prism of 5° in the same position relieved the diplopia and requiring to be worn for a few days, all the symptoms improving and diplopia disappearing.

The rarity of this nerve being affected has led me to report this case along with that of the affection of the superior oblique.

REMARKS.

Dr. Howe inquired if the effusion would not have something to do with the affection of the muscles.

Dr. Little thought not.

DR. HOWE remarked that he had observed a case of injury in which there was proven to be an effusion in the upper part of the orbit of the eye, and from which the patient recovered without any interference whatever. He thought, in the case reported by the Doctor, that there might have been an affection of the nerve first, and afterward of the muscle.

DR. LITTLE remarked that in his case the improvement took place immediately after the application of electricity.

DR. NOYES reported that three cases in his practice had been relieved at once by operation.

CASES OF LACERATION OF THE EYELIDS.

BY DR. HENRY D. NOYES,

NEW YORK.

A NOT infrequent accident is laceration of the eyelids. Within two years three such cases have come under my notice, and I report them because I have found that a certain method must be adopted to get the best results in healing. The points to be observed will be alluded to in narrating the cases.

CASE I.—February, 1877. A boy 19 months old, while playing about the floor, got possession of a hook used to button shoes, pushed it under the upper lid of his left eye, and tore away the lid from its attachment at the inner canthus. I was called to the case within an hour, and found a laceration beginning on the nasal side of the punctum and running upward and outward along the supra-tarsal fold for three-fifths the length of the upper lid. The bleeding had stopped and the flap hung down over the cornea.

I put the child under chloroform, and brought the parts together in the following way: inasmuch as the tarsus had been detached, I saw the necessity of bringing it into proper apposition. To this end I carried a silk suture through its upper edge, at about the middle of the laceration, in the form of a loop, through the entire thickness of the lid at the fornix, and brought both its ends out on the skin at adjacent points, and tied them over a little roll of muslin. The suture had a needle at each end, which was held by needle-forceps. The performance of this step was the critical point in the whole pro-

ceeding. It drew up the tarsus as by a sling to its proper relations at the fornix. Afterward the external wound was united by several fine interrupted silk sutures and the skin put into perfect coaptation. Slips of isinglass-plaster were laid over the lid, a pad of cotton and a bandage applied. The needles were small and those used at the inner canthus were semicircular.

On the sixth day all the sutures had been taken out, and by the tenth day the eye needed no further attention. The line of cicatrix is now almost invisible, the appearance is perfectly natural, and the command of the lid is complete.

The suggestion to be made in this case is the importance of uniting the mucous membrane and tarsus before the wound of the skin is closed, and in this very young subject the sling-suture was the most suitable, both for its effectiveness and because it could be easily withdrawn.

CASE II.—Man aged forty, living in New Jersey. In attempting to move a horse-rake which was placed with the shafts turned up against a barn, a hook caught his left upper lid and tore it from its orbital attachment for about half its length from the inner canthus to the middle of the brow. The globe was not hurt. A physician of the neighborhood put sutures into the skin, and made a rough coaptation. External union took place, but the inner canthus was not restored and the tarsus had not been united. In course of time cicatrization of the under surface was accomplished, and ectropium began. Gradually this deformity increased, and the exposed conjunctiva underwent the usual florid papillary hypertrophy; the cornea became inflamed, hazy, and vascular. About five months elapsed before I saw him, when he not only presented a disagreeable deformity, but suffered from lachrymation, photophobia, pain, and dimness of sight. By passing my finger beneath the lid, up toward the fornix, I recognized a dense cicatricial ridge which corresponded to the outer wound. Evidently this hard tissue was the cause of the ectropium, both by its contraction and by the barrier which it formed to the return circulation of the veins and lymphatics.

The man was put under ether, and the cicatrix was cut out along its entire length, thereby reproducing almost perfectly the condition at the first injury—giving a loose flap, which was to be re-established in correct relations. Anticipating considerable retraction, I aimed to carry the inner end of the flap, beyond the inner canthus.

I not only excised the old cicatricial tissue at this point, but cut out an open angle of healthy skin, into which the point of the flap was to be thrust and held by sutures. The manœuvre was difficult because the small curved needles had to be directed up the acclivity of the nasal bones, and to bring out their points without breaking them was troublesome.

This was not, however, the first step. A careful coaptation of the tarsal edges and mucous membrane was made by three stitches, which were applied to the everted flap and left in situ in the fornix, when the flap should be ready for adjustment to its proper place, and for the application of stitches to its cutaneous surface. Then the preparation of the inner angle, as above mentioned, was made, and the necessary interrupted stitches introduced. These were supported by a fine insect-pin (harelip suture) at the inner angle. Before replacing the everted lid some of the hypertrophied conjunctiva was excised. A bandage was applied and retained for twenty-four hours. Cold-water dressings were used, and about the tenth day the patient went home. During the year I have seen him several times, and at the last visit the eye was entirely comfortable, the cornea clear, the conjunctiva healthy, the lid in position, and its movements normal. It could be lifted to the proper degree, and the line of cicatrix was inconspicuous. The inner canthus had by retraction come to be of correct shape.

CASE III.—An injury of far greater extent and severity is now to be related, in which the probable total severance of the levator palpebræ and of much of the skin, coupled with fracture of the orbital bones, made it impossible to effect complete restoration of the parts. The case has interesting features aside from the damage to the lids. For the notes I am indebted to Dr. Oppenheimer, house surgeon of the New York Eye and Ear Infirmary.

Charles H., aged seventeen, about a year and a half ago was trying to force his way through a crowd in Washington market, and, to slip between persons who were carrying burdens on their shoulders and baskets on their arms, dodged his head down and struck against a stationary hook used for hanging meat. It penetrated the inner and upper corner of the orbit, lacerated the soft parts, and fractured the roof of the orbit. He was thrown down insensible, and taken to the New York Hospital, where he remained six weeks. After this time he came to me as an out-patient at the New York Eye and Ear Infirmary. There was total eversion of the upper lid, the conjunctiva enormously thickened, the eyeball deviated to the inner

canthus strongly, with no power to turn it out. A deep notch could be felt with the finger about the middle of the superior orbital margin, indicating where the bone had been fractured, and the history of his residence in the hospital implied that he had had meningitis. The pupil was normal, the eyeball seemingly uninjured, but by the ophthalmoscope the optic nerve was found in a state of marked atrophy, presumably the stage succeeding severe neuritis. The very oblique position of the eye made examination of sight almost impracticable, but a low degree could be ascertained. The cornea was covered, notwithstanding the eversion of the upper lid, because all its tissues were so œdematous and thick. The everted lid border could be turned down, but would slowly return to its unnatural situation. It was evident that a long time must be allowed for reduction of the swollen lid to a normal state. I simply directed the continuous use of a pressure-bandage, applied as tightly as could be borne, and removed only so often as cleanliness required. After about a year the upper lid was thin enough to hang without eversion, but it could not be lifted, and there was a deep notch at its inner and outer angles, and from the inner angle a cicatrix ran along beneath the brow, almost to the external orbital border. An improvement in sight had occurred, so that upon the outer part of the field he could see movements of the hand.

February 1, 1879, patient was etherized, and I attempted to bring the eyeball to the middle of the palpebral slit, and hoped something might be done to help the upper lid. I proposed to release the adhesions of the eye at the inner canthus, and to attempt to find the distal end of the torn-off rectus externus, and give it a new attachment to the globe. Extensive dissection was made at the inner canthus, by which not only was the insertion of the rectus loosened, but the surrounding connective tissue freely cut. There was abundant cicatricial substance here, and parts were firmly condensed together. Having done all that seemed appropriate on this side, I next began upon the outer part of the globe to search for the rectus externus. Its stump was found, but when an effort was made to turn the globe outward to meet it, no rotation could be effected. Puzzled by this unlooked-for state of affairs, I could not find any explanation at the inner canthus, and gradually worked my way at the outer canthus backward to the deep part of the orbit. I soon found that there had been fracture of the external wall, and pushing in with finger and scissors I at length came upon a spot where the posterior part of the globe had become united to the

periosteum. Keeping close to the bony wall and using a strong pair of blunt-pointed scissors, curved on the flat and holding their convex surface against the globe, I succeeded, bit by bit, in clipping away these attachments and rendering the eye movable. I had by this time arrived almost at the orbital apex. The eye could now be lifted forward about 4 mm., and rotated outward a little beyond the median line of the orbit. Examination of the upper lid showed that a dense cicatricial band separated the superior fornix from the parts below, like an hour-glass contraction, and that a considerable space existed above, which could be reached with some difficulty by forcing the finger between the cicatrix and the globe. No effort was made to improve the state of the lid, but the conjunctival wounds were closed after the external rectus had been brought into the best attainable position by sutures. It was not expected that the eye would be made mobile, but a more natural, permanent position was sought for.

The ensuing reaction was rather severe, but the parts healed well. Exophthalmus was caused, but subsided, and the patient went home in two weeks.

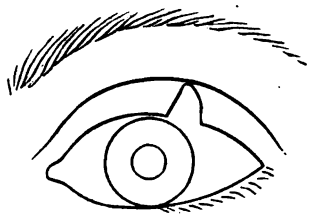
At the last view of his condition, the upper lid had drawn up somewhat, but was helpless in ptosis; the eyeball was in correct position.

Whether any greater improvement is possible is very doubtful. The separation of the levator was complete, and the fracture of the upper plate of the orbit must have matted the tissues together so as to hold the remainder of the muscle in perfect bondage. Excision of a piece of skin would merely reproduce ectropium, and incision or excision of the scar would cause uncertain and possibly disadvantageous results.

Since the meeting of the society I have seen the case, and find that retraction has taken place in the upper lid, but not enough to uncover the cornea. The skin hangs perfectly smooth, without wrinkles to indicate action of the orbicularis or of the levator. When he forcibly closes the lids the upper does not descend, and corrugates only through the communicated action of the orbicular fibres of the lower lid. Considerable conjunctival thickening exists, and its treatment is the present indication. The globe remains fixed upon the middle of the orbit, has no motion to the right or left, and slight movement up and down.

Congenital fissure of the upper eyelid.—Katie D., aged seven

months, was brought to me by Dr. Nolden, in May, 1879. There was a cleft near the middle of the right upper lid, running through the tarsus, and looking like the accompanying diagram. This was congenital. I pared the edges, and attempted to avoid any notching of the tarsal edge by hollowing out the sides of the fissure and causing the tarsal end of the line of junction to protrude in a nipple under the pressure of the sutures. Harelip sutures with fine insect pins were used, and while union was obtained, the subsequent retraction of the scar gave rise to a small notch.



Before the operation the cornea was to be seen through the fissure, but afterward the eye was satisfactorily covered.

GLIOMA OF BOTH EYES—REMOVAL—RECURRENCE—DEATH—AUTOPSY.

By DR. HENRY D. NOYES,

NEW YORK.

THE case to be reported was presented to the New York Pathological Society when the specimens were fresh. Further details of the microscopic examination of the brain are now supplied.

In November, 1878, a very fat boy of Jewish parents, about one year old, was brought to me at the New York Eye and Ear Infirmary. The father stated that when he was six months old a glistening reflex was noticed in the left eye. He did not know at what period something similar appeared in the right eye. It was found that the vitreous space of each eye was occupied by a yellowish white growth, which in the left was distinctly vascular and pressed upon the crystalline; in the right eye the growth was not so large, but was distinctly visible. In view of somewhat retarding the deeper development of the disease and to anticipate the probable speedy extension outside of the eyeball, enucleation of the left was advised.

The case disappeared from observation until January, 1880, when

I learned that the parents found means to go to Germany in the preceding August, and took the child to Prof. Förster, of Breslau, who advised and performed enucleation of the left eye. For some months the orbit continued healthy, but when the child was presented to me the left orbit was filled by a secondary growth, which had been noticed for three weeks. It protruded between the lids, and had a fleshy look and firm feel. Under ether the growth was removed with little difficulty and with little bleeding. It was detached from the orbital walls chiefly by the finger and the closed scissors used as a spatula. At the apex it was unavoidable to leave a mass of substance, similar to the tumor, adherent to the foramina. The growth was about the size of a small hen's egg. The child made a good recovery in about six weeks. For three weeks more relief continued, when a fresh growth appeared in the orbit, and was accompanied by severe pain in the temporal and frontal regions, and by frequent vomiting. It was evident that the disease had extended to the brain, and no further operation was to be entertained. The other eye had meanwhile been exhibiting an increase in the deposit, but its advance was not rapid. Opiates were administered and other palliative measures employed, but death occurred March 18, 1880.

An autopsy twelve hours after. In removing the calvarium numerous adhesions were found between the dura and pia, chiefly along the longitudinal sinus, and on either side of it for its entire length. The brain was excessively soft, and its removal was difficult. On turning up the base, the substance was almost like custard in softness, and it was impossible to preserve its integrity. The optic nerves were divided near the commissure, and the brain put at once in Müller's fluid. The roof of each orbit was chiselled away and the contents removed.

The secondary growth in the left orbit caused the lids to bulge forward, filled the entire cavity, had caused absorption of the greater wing of the sphenoid, and left only the thickened dura mater intervening between it and the brain.

The right eye was opened and found to be almost wholly appropriated by the tumor, which had appeared in the iris and also reached back into the optic nerve. It was necessary to leave the specimens for six weeks in Müller's fluid before they would permit examination.

The following careful report has been prepared by Dr. James L. Minor, and is as perfect as the condition of the specimens would permit. The excessively soft state of the brain was clearly due to inflammatory changes mingled with the gliomatous infiltration.

REPORT ON SPECIMENS, BY DR. J. L. MINOR.

The specimens, after hardening in Müller's fluid, presented the following appearances: the orbital tumor is an irregular conical mass, about 5 ctm. from base to apex, and 3 ctm. in diameter at its base. Right eye externally normal, and was divided meridionally from cornea to optic nerve. The anterior chamber is present, but encroached upon by a bulging forward of the iris and crystalline lens, the latter being dislocated downward and outward by a neoplasm filling the vitreous chamber so completely as to prevent its starting-points from being ascertained. The optic nerve remaining attached to the globe is about 2.5 ctm. in length, and is slightly enlarged at its entrance into the eye. The brain is very soft and breaks down easily. The pia mater is thickened, and in many places presents a granular appearance. Microscopic examination: the orbital tumor is built up of the characteristic gliomatous structure, numerous small round cells, a scanty supply of delicate connective tissue, and fine blood-vessels, with a small quantity of a homogeneous matrix.

The eye presents the following conditions: cornea normal; the iris and ciliary body both infiltrated with gliomatous cells. The intra-ocular growth is composed of the same material that is found in the orbital tumor. The retina is implicated to such an extent by the gliomatous infiltration that its intimate structure cannot be studied. The choroid presents the same infiltration in a less marked degree, while the sclera is not entirely free. Sections of the optic nerve, made at various points from the lamina cribrosa to its extremity, showed the same cell-infiltration as found in other parts. The whole nerve is involved, and its sheaths also. In the brain the pia mater is the structure chiefly involved, and this is the case throughout its whole extent. In places it is 6 mm. thick, and composed almost entirely of glioma-cells. The cell-infiltration extends into the cortical matter in certain localities, but the white substance is not implicated. A peculiar feature observed in the brain-section is the presence of numerous large cells, some of which contain granular matter, others are nucleated or multinucleated, while some contain smaller cells in their interior, resembling the glioma-cells. In one instance the number of these small cells in the mother-cell was eight.

It is to be regretted that in all of the specimens examined the gliomatous infiltration was so extensive, for the normal relation of

the tissues was thus disguised to such an extent as to preclude a satisfactory examination of the changes incident upon this disturbance.

The intra-cranial portions of the optic nerves, chiasm and tracts, could not be found, owing to the mutilated condition of the brain. The brain was so soft that it broke to pieces when handled. This condition rendered topographical examination impossible.

REMARKS.

DR. AGNEW wished to say a few words upon the case of coloboma. He exhibited a photograph showing the appearance of a case in which he had operated some time ago. There was a rectangular deficiency of about one-third of the horizontal length of the lid; the skin ran over and behind the edges of the coloboma. The incision was carried so as to lift up in the flap the three sides of the coloboma. Having secured a sufficiency of flap, he everted the lid and stitched first what could be found at the tarsal cartilages, including the conjunctiva, and bringing the edges together, finally stitched the skin. The doctor continued his remarks, stating that in the Transactions of this society for 1875, p. 349, he had recorded a case of glioma, and that Dr. Eno had made a concurrent report of the microscopical appearances. The subject of that double operation, whose photograph he showed, was still alive, being seven years old. The first eye was enucleated on May 5, 1874, the child being thirteen months of age. The right eye was enucleated on November 30th of the same year. It should be remembered that the disease was traced into both optic nerves.

ON KERATITIS FROM MALARIAL FEVER.

BY DR. CHARLES J. KIPP,
NEWARK, N. J.

JUDGING from the large number of cases of this affection which have come under my observation, it is of frequent occurrence. It is commonly developed within a few days after an attack of intermittent fever, often simultaneously with the appearance of herpetic vesicles on the nose or lips. In some of my patients every fresh attack of the fever was followed by this corneal affection. In the great majority of the cases that I have seen, only one eye was affected.

If the eye is examined shortly after the first symptoms of irritation are noticed by the patient, one or two or more slightly raised, irregular, opaque lines of varying length will be found on different parts of the surface of the cornea. At the same time some circumcorneal injection will be present. On the following day these opaque lines have increased somewhat in length, whilst at the same time the middle portion of the opacity has been transformed into a shallow ulcer. Under favorable circumstances no further increase in size takes place, the remaining opaque epithelium is thrown off, and reparation begins, to be completed only after several weeks. But not unfrequently the ulcer continues for days, and even weeks, to grow slowly in length, and at the same time sends out club-shaped, slightly raised, grayish offshoots from its sides. In some of my cases the ulcer crept across the entire cornea, and, in a few others, in which several ulcers appeared simultaneously on different parts of the cornea, nearly the whole epithelial layer was eventually destroyed. As a rule, the ulcer shows no tendency to increase much in depth, and its floor and edges, although always of a bluish gray tint, are rarely opaque. The middle and inner layers of the cornea generally remain transparent throughout, but in neglected or maltreated cases an extensive star-shaped opacity of a slightly yellowish gray tint is sometimes developed in the inner layers of the central part of the cornea. A hypopion is but rarely seen, even in the severest cases, and spontaneous perforation of the cornea did not occur in any of

my cases. More or less hyperæmia of the iris is not unfrequently present. Circum-corneal injection was only rarely absent, but in no case was the injection accompanied by much swelling of the conjunctiva. A decrease of the tension of the eyeball, or a diminution in the sensibility of the cornea, could not be demonstrated in any of the cases. The development and growth of the ulcer was always accompanied by very severe pain in and around the eye, and by photophobia and lachrymation. The process of repair was, in all cases, extremely slow, two to four months being generally required for its completion.

Of the various local remedies which I have used in this affection, none have afforded greater relief than the pressure-bandage, warm fomentations, and the sulphate of atropia. In addition to the local treatment I have always prescribed quinia and iron in large doses, and during the last two years I have given arsenic, generally in the form of Fowler's solution, in medium doses, in many cases with very beneficial results. In cases where the pain was great I have never hesitated to give morphium in sufficient quantity to give relief.

The disease here described is not unlike the corneal affection observed by Horner ("Sitzungsbericht der Ophthalmologischen Gesellschaft im Jahre 1871," p. 325) as occurring simultaneously with herpes nasalis in individuals suffering from severe catarrhal affections of the respiratory organs. It differs from the latter, however, in this, that, instead of transparent vesicles, small, opaque elevations, not unlike minute phlyctenulæ, arranged in lines, are developed in the initial stage of the disease. The decided tendency of the ulcer to spread, observed in my cases, was not noticed in Horner's cases.

The only reference to keratitis from intermittens, which I have been able to find in the literature at my disposal, is by O. Becker ("Graefe und Saemisch's Handbuch d. Augenheilkunde," Vol. V., p. 350), as follows: "It is also said that at times, after the eye had been bandaged for a few days, the epithelial layer of the cornea became suddenly cracked and was thrown off in large patches, but was completely regenerated in a few days. This description corresponds closely to the rare and very painful keratitis, following intermittens, which has been described by the older writers, but is totally ignored in modern literature." My efforts to find a description of this form of keratitis in the older works on eye diseases have been fruitless.

REMARKS.

DR. NOYES inquired of Dr. Kipp if he had made inquiries in reference to the occurrence of supra-orbital neuralgia, or anæsthesia of the cornea.

DR. KIPP replied that in his cases there was severe neuralgia, but, so far as noticed, no anæsthesia of the cornea.

DR. NOYES thought that anæsthesia of the cornea occurred more frequently than Dr. Kipp's observations would lead one to suppose. He had often seen it in herpes ophthalmicus.

A CASE OF ONE-SIDED COMPLETE BLINDNESS FROM ISCHÆMIA RETINÆ, ENDING IN PERFECT RECOVERY.

BY DR. H. KNAPP,

NEW YORK.

ON May 28, 1880, I was consulted by Miss Laura M., thirty years old, of New York, giving the following history: She had been well and strong until lately. Her father had a severe illness, which during the last seven months required constant care and night-nursing, all devolving upon her and her younger sister. He died a few weeks ago. She grieved very much, and during his illness had fallen from flesh and become feeble and pale. Occasionally she had noticed flashes of light and scintillation in the left eye. Five days ago she noticed that, without any assignable cause, the sight of the left eye was obscured from above downward, so that in the course of several minutes complete darkness occupied the upper half of her visual field. This had lasted unchanged four days, when, yesterday, the lower half was as suddenly and completely obscured as the upper. She had no pain, felt no uneasiness in any part of her body, but could not see a ray of light with the left eye.

On examination I found the external appearance and motions of both eyes equal and normal, with the exception of the pupils. The right pupil was small and moved briskly on changes of light. The left pupil was over medium size, and, on changes of light, did not move at all. When both eyes were left open, and the right shaded, both pupils dilated promptly, and contracted just as readily when

the right was exposed to the light; but when the left eye alone was shaded, or exposed to the light, both pupils remained completely unchanged. This behavior of the pupil dispelled at once my suspicion of simulation and the use of atropia. Several tests for simulation, which I nevertheless instituted, proved clearly negative. Tn. Visual field complete in both eyes. Media clear. The optic disks looked abnormally pale, and both arteries and veins were smaller and less numerous than usual. Firm pressure on the globe produced arterial pulsation. No other abnormities were found in the eyes.

The patient was neither nervous nor hysterical, and all her functions were in perfect order. I may still mention that her family physician had employed electricity to the eye without any effect.

My diagnosis was: insufficient nutrition of both retinæ, which in the left eye had been of such a degree as completely to suspend the visual function. I ordered her lactate of iron, 0.05 gramme three times daily, generous diet and milk-punch, and told her to pass two hours of the morning and two hours of the afternoon in Central Park, which at that time presented the most luxuriant foliage. In the evening of the same day she could distinguish light and dark. Her sight returned from above downward, just as she had lost it, and grew a little better every day.

June 1st.—Four days later she presented herself again. Her left pupil moved slowly. She counted fingers excentrically in the upper half of her visual field. Fundus as before.

June 4th.—Condition still improved, only in the lower part of fundus no perception of light.

June 19th.—S. $\frac{20}{50}$; F. complete; pupil somewhat wider than on the other side; movable.

July 10th.—S. $\frac{20}{20}$; F. complete: pupil normal. She reads 0.25 at 5 inches. Her optic disks are still abnormally pale, but less so than at the beginning of the treatment; and though the largest vessels are still rather small, a pinkish hue of the area of both disks indicates a better filling of the capillaries, which, when present all over the retina, as I may reasonably expect it was, fully accounts for the return of nutrition and function. If you ask me how I explain the existence of complete blindness in one and perfect light in the other eye, when the same supposed cause acted alike on both eyes, and the ophthalmoscopic condition in both eyes was also the same, I can offer no satisfactory answer, but may remind you of the well-known fact that after cerebral or other disease both optic disks may look alike and markedly atrophic, whereas the functional examinations

prove the vision in one eye abolished, in the other normal. For the explanation of such cases we have to look more deeply than at the head of the optic nerves.

Mr. President and gentlemen, I do not recollect having met, in my practice, with exactly a similar case, and therefore I wanted to place it on record without any further comment.

REMARKS.

DR. NOYES inquired if Dr. Knapp had tried nitrite of amyl in cases of ischæmia of the retina?

DR. KNAPP replied that he had, but without result.

DR. S. BULLER, of Montreal, Canada, remarked that he had used nitrite of amyl, and thought it was of advantage in ischæmia of the retina.

DR. WEBSTER remarked that, in regard to the treatment of these cases by nitrite of amyl, he would say experiments had shown that it was better to give nitrite of potassium.

There being no further remarks, Dr. Knapp proceeded to read his second paper, entitled, "Eight Cases of Sclerotomy for Glaucoma."

EIGHT SCLEROTOMIES FOR GLAUCOMA.

BY DR. H. KNAPP,

NEW YORK.

I DO not know, Mr. President and gentlemen, how far the operation of sclerotomy for glaucoma has found favor in this country. The practical and critical papers of Mauthner and Schnabel, published in the *Archives of Ophthalmology and Otology* during the last years, seemed to inspire us with confidence in this operation, if the recommendations of its originator, Quaglino, and early cultivators, De Wecker, Bader, and others, did not at once conquer our reluctance to abandon in its favor an operation which had given the most satisfactory results. I, for one, have followed the history of sclerotomy with great interest, yet such is my conservative spirit and my pious veneration of the immortal inventor of the glaucoma-iridectomy that it required the repetition of cases of so-called malignant glaucoma to impel me to make some cautious attempts at the new operation. As the results thus far have not been discouraging, I will

state my experience before the society in briefly sketching the seven cases (eight eyes) of glaucoma which I have operated upon by sclerotomy.

CASE I.—Mrs. F. F., Jewess, aged fifty-three, presented herself at my clinique, September 10, 1879. Her left eye had absolute glaucoma with a deep excavation; her right, inflammatory glaucoma for several weeks, $+T_2$. Faint perception of light; media turbid; fundus not visible. For personal reasons she was refused treatment, and advised to go at once to some other eye hospital. Three weeks later she returned, unoperated, and materially in the same condition. She and her husband begged so much, that I admitted them to the New York Ophthalmic and Aural Institute, and October 4th performed sclerotomy on both eyes, after previous instillations of eserine. The tension in both eyes had been $+T_2$. The operations were made with a v. Graefe's knife, very peripherically. Immediately afterward the pupil in each eye was drawn upward, and has remained so, in spite of continued instillations of eserine. There was no prolapse of iris, nor a visible incarceration. The healing was smooth. Tn in both; remained normal in right, but rose to $+T_1$ in left eye. The media of the right eye cleared up. S. R. $\frac{1}{\infty}$ as before, L. o. Some months later, Tn in both. R. opt. disk whitish, not excavated. L. as before. S. o. in both.

CASE II.—Mr. Henry Van S., Dutch, aged sixty, consulted me, March 1, 1880, having noticed a gradual decline of sight for a year. He had S. R. $\frac{20}{200}$, L. $\frac{20}{40}$. Corneæ, anterior chambers, irides normal, pupils small, promptly movable. R. $+T$? L. Tn. Excavation with atrophy, marked, in both. F., equal in both, very much contracted, from point of fixation 1″ or 2″ outward, when tested at a distance of 1′.

March 2d I performed sclerotomy on the right, iridectomy on the left—the better eye—both without accident. Recovery in both undisturbed. Result when last seen, May 20, 1880: S. R. $\frac{20}{100}$, L. $\frac{30}{20}$. Tn in both. The right eye has a central movable pupil, the left has a large, clear, peripheric coloboma, the remnant of pupil moving well. After the operation the sight in the right eye has steadily improved, that in the left steadily diminished. With cylindrical glasses no improvement in either. The field of vision in the left eye has remained as it was before the operation; in the right it had expanded to about twice its previous diameter. The atrophic appearance of the disk remained more marked in the right than in the left eye, and

the depth of the excavation, determined in the erect image, was 1.13 mm. in the right, and 0.94 mm. in the left eye. The tension in both eyes was never appreciably increased.

CASE III.—E. B., aged nine, of German nationality, of New York. One-sided megalophthalmus congenitus, with excavation of od. and increased tension; S.=o. Other eye healthy. As the enlargement in the first was still progressive, I made an upward sclerotomy, which healed nicely with a central round pupil. Eserine was instilled before and after the operation. The tension was at first reduced, later normal. During the next six weeks, as long as patient was under observation, the tension varied between the normal and slight increase; the latter condition, however, being more frequent and lasting. The size of the globe seemed to be unchanged.

CASE IV.—Mrs. A. M., a Jewess, aged fifty-four, had an acute attack of glaucoma six weeks before she presented herself, for which an operation had been advised, but refused. On admission, $+T_2$; ant. chamber shallow; pupil wide. S=o. Great pain, not materially relieved by eserine.

March 30, 1880, upward sclerotomy, somewhat difficult of execution on account of shallowness of ant. chamber. The tension was reduced after the operation, but some synechiæ formed on the lower edge of the pupil, probably from the use of eserine. Three weeks later the central pupil was somewhat irregular; a beginning of a cystoid scar showed itself at the inner part of the wound, near the vertical meridian; the tension was again moderately increased, but no pain was present. S.=o.

CASE V.—Mrs. A. C., aged sixty-five. Painful glaucoma after being struck on the eye eleven weeks previously. $+T_3$. Pupil very large; immovable, disk dimly seen; not excavated, S.=o. May 1, 1880. Upward extensive sclerotomy. No reaction. +T? S.=o. No pain.

CASE VI.—Mrs. C. P., American, aged fifty-six, presented herself June 25, 1880. Inflammatory glaucomatous attacks, with halos, and very gradual impairment of sight, in the left eye for four, in the right for two years. On admission both pupils were wide and immovable; lens diffusely opaque; $+T_2$ each. S. L.=o., R.=$\frac{1}{200}$. F. R. contracted inward to point of fixation, above and below in a line curving outward from point of fixation like an ellipse. L. od., complete atrophy and deep excavation. R., excavation, marked arterial pulsation.

Admitted to hospital June 26, 1880. Leeches to temple and

eserine did not reduce the eyeball tension nor make the pupil narrower.

June 27th.—Sclerotomy upward, leaving the pupil round. Eserine in evening and morning; no influence on pupil.

June 29th.—Pupil smaller in both eyes; neuralgia disappeared.

June 30th, 9 A.M.—Pupil R. less than medium size. Counts fingers well. In the afternoon the pupil was found pear-shaped and a part of the iris lay in the inner part of the scleral wound. The anterior chamber was of almost normal depth. Patient was not aware that anything happened to her eye, nor could she assign any cause for the displacement of the pupil. She had lain in bed, quietly on her back, the whole day. As soon as I had noticed the displacement of the iris I decided to perform iridectomy at once by excecting the incarcerating portion. In this attempt I was surprised by an occurrence which, under similar circumstances, it may be well to remember. I split the conjunctiva and episclera over the black patch of iris in the wound, with a v. Graefe's knife, without wounding the iris. The aqueous escaped and at the same time the iris receded into the anterior chamber. I introduced a blunt spatula into the anterior chamber, smoothed the iris gently and in such a way that the pupil became central, round, and narrow. As, after withdrawal of the spatula and passing the lids over the cornea and sclerotic, no displacement of the iris was visible, I instilled a drop of eserine into the eye and bandaged it. The further progress of the recovery was undisturbed. The wound closed perfectly. The pupil remained round. Tn. S. $\frac{10}{200}$. Discharged July 9th.

July 15th.—Seen again. F. and S. the same. T. not appreciably increased, but arterial pulsation again present, though not so marked as before the operation.

July 19th.—No arterial pulsation. Tn. S. $\frac{10}{200}$. Feels comfortable, and thinks she sees better.

CASE VII.—Mr. J. F., Jew, aged seventy-three. R. operated on for glaucoma seventeen years ago by a New York ophthalmic surgeon. Sight said to have rapidly failed after the operation. On admission, large outward coloboma, with columns adherent to thickened cicatrix. L. pupil less than medium size; sluggish; $+T_1$; iris dirty brown. S. $\frac{20}{40}$, E. F. elliptical from point of fixation outward, with a great axis of 15°.

The patient was exceedingly diffident, yet the decline of sight in his left eye had been so marked in the last three months that he felt he was on the way to blindness. Considering his age and the un-

fortunate result, I advised him to have a sclerotomy made, which I would undertake as less risky than an iridectomy, provided he would give me discretionary power to make iridectomy in case prolapse of iris should occur during or after the operation. He and his family consenting to that, I performed sclerotomy July 15th, thrusting a narrow-bladed knife through the upper peripheric part of the anterior chamber, the extent of puncture and counter-puncture being 6‴. In cutting the sclerotic and letting the aqueous slowly out, the pupil enlarged upward, with no tendency to contract by turning the knife on its axis. As soon as the knife was withdrawn, the iris prolapsed in the outer part of the wound. Instillation of eserine, closure of the lids, rubbing, reduction with a blunt spatula, opening the conjunctival bridge as in the previous case, and a renewed attempt at reduction with a blunt spatula, all failed. I therefore exsected the prolapse, making a clean, though small iridectomy, taking great care to remove the iris out of the wound. The pupil occluded by blood. He had pain for the first three nights. On the fourth day the pupil began to clear up, and the anterior chamber to fill again. The tension after the operation has been normal, and the resident surgeon writes me that the eye is doing well. The patient was seen again in January, 1880. S. and F. as before the operation.

Mr. President, I beg to make some comprehensive remarks on these cases:

1. The *mode of operation* was essentially that recommended by *Wecker* and *Mauthner*, using a v. Graefe's knife, making the distance between puncture and counter-puncture five or six lines long, and dividing the sclero-corneal juncture as deeply in the sinus of the anterior chamber as the position of the iris would permit. In every case a small scleral bridge was left in the centre, yet so thin that the blade of the knife shone through, as in making a microscopic section. The aqueous was let out slowly, in order to prevent a prolapse of iris, if possible.

2. *Accidents.*—In the first two operations the pupil was oval, the iris being slightly drawn toward the wound, yet without visible incarceration or adhesion. In Case VI. prolapse occurred spontaneously on the fourth day, but reduced itself when the aqueous escaped, after the conjunctiva over the prolapse had been cut. In Case VII. prolapse occurred during the operation, proved irreducible, and the protruding iris was exsected.

3. *Operative results.*—In all cases the tension was reduced in

the first weeks after the operation; but in some of them increased again later, without, however, reaching its former height. Pain and the other inflammatory symptoms, where they had been present, disappeared.

4. *Visual results.*—In the five eyes with absolute glaucoma, no degree of sight, of course, was restored. In one case of chronic glaucoma (Case VI.) the vision, thus far (three weeks after the operation), is as good as before. Patient seen in November, 1879. Her sight has remained the same. The last case does not count, since sclerotomy was combined with iridectomy, and was operated on only a week ago. The second case furnishes a good success in the eye operated on by sclerotomy, especially when contrasted with the failure of iridectomy on the fellow eye: in the former, some improvement of sight and enlargement of the field of vision; in the latter, gradual decay of sight. Both eyes were as much under the same conditions as possible.

Mr. President and gentlemen, I do not presume to draw any conclusions of importance from so small a number of operations. As far as they go they confirm the statements of Mauthner in his exhaustive and very suggestive papers on this subject—"Glaucoma Aphorisms"—published in the *Archives of Ophthalmology and Otology*, Vol. VII., p. 179, etc., and Vol. VIII., p. 25, etc. My own views as to the indications of sclerotomy are as follows:

1. In cases of simple chronic glaucoma with a narrow field of vision and marked excavation, I would prefer sclerotomy to iridectomy, and if both eyes are affected, operate on one at least by sclerotomy.

2. In megagophthalmus (buphthalmus) congenitus I would only perform sclerotomy, since in such cases iridectomy is almost always fatal to the eye.

3. In glaucoma of younger persons, *i.e.*, below thirty-five years of age, and in cases of hemorrhagic glaucoma, I would prefer sclerotomy to iridectomy, since the results of the latter operation in these cases are mostly unfavorable.

4. Encouraged by the experience derived from the above related operations, and on the strength of the statements of Wecker, Mauthner, and others, I consider it legitimate to try sclerotomy also in cases of acute glaucoma. If it prove equally curative as iridectomy, it will have a decided advantage over this operation by leaving the pupil round, small, and central.

REMARKS.

DR. NOYES remarked that his experience in sclerotomy for glaucoma was limited to a single case. It occurred in the person of a young woman under twenty years of age, who came to him in December last, having a subacute attack of glaucoma which passed into a chronic condition. She had a complete picture of glaucoma, and the eye was painful. She was told that an operation alone could afford her relief. She refused to submit to this for ten days, but finally consented, and sclerotomy was done. The effect of the operation was to relieve the pain and to reduce the tension to the normal. The pupil continued circular, and the eye, for a period of some weeks, remained normal. The tension became increased, and the other eye, which had been sound, broke out with an attack of acute glaucoma. Dr. Noyes feared to risk the operation of sclerotomy in the second eye, after his experience with the first, and made an iridectomy. The result of this was vision $\frac{20}{20}$, an uncommon result after this operation in glaucoma. In his judgment the fitness of the operation was about as Dr. Knapp had recorded. He continued his remarks by relating the history of a boy under ten years of age, who was brought to him with an excessively distended eyeball. The eye was twice its normal bulk, and the ciliary region was spread out into a dark zone one-fourth of an inch in length. It did not occur to him to perform sclerotomy, but he recognized the fact that iridectomy would be fruitless, and reasoned, in view of the existence of the posterior synechia and distention of the eyeball, that it would be desirable to remove the iris completely. This was accomplished by making a small section as near to the periphery of the iris and cornea into the anterior chamber as possible. A rather large, sharp-pointed hook was thrust over so as to reach the opposite side of the iris, when traction was made until the periphery of the iris gave way. As this gave way he removed, with the forceps, the entire structure. No important hemorrhage followed. A bandage was applied, and after three or four days it was found that the globe was recovering its normal diameters. In four weeks it was restored to the same dimensions as the other eye. The semi-transparent blue color became a uniform gray opacity. He did not know that such an operation had been tried in just such a case.

DR. RISLEY remarked that in November, 1878, he was consulted by a lady with absolute glaucoma in the left eye, her vision being $\frac{20}{100}$ in the right. Her field of vision was very narrow, but she could, with difficulty, go about with the remaining eye. Iridectomy had been proposed over and over again by other surgeons, but each time rejected. She finally, however, consented to the operation. A broad iridectomy above was done in November, 1878. Her field of vision widened out above to twice its former extent, and she retained vision until the following March, when it began to recede and pain came on. The first of April he found the stump of the iris at site of the

iridectomy adhering to the cornea, and then proposed and did a broad sclerotomy, making the puncture near the horizontal line and carrying the incision through the adherent stump of the iris, and succeeding in withdrawing his knife without prolapsus of the iris. The eye was bandaged, wound healed kindly, and a month later tension was normal. He saw her in June, two months after the operation, with her field of vision where it was after the iridectomy, and vision was still $\frac{20}{100}$, with a plus-cylinder.

DR. HASKET DERBY had a case where glaucomatous symptoms came on in a child seven years of age, after an operation for the removal of opaque capsule following a traumatic cataract. There was marked increase of tension, corneal anæsthesia, dilatation of the pupil, limitation of the visual field, and cupping of the disk. To avoid the deformity of an iridectomy, he had performed sclerotomy upward, in the usual manner. The wounds of puncture and counter-puncture had never solidly closed. Almost immediately a staphylomatous protrusion began to form about each of them, and up to the present time had steadily increased. There were now two rounded tumors, almost in actual contact, each about eight millimetres in diameter and six millimetres high, visible as protrusions through the closed lids. Vision had never returned. No pain had been suffered, and there were no symptoms of sympathetic irritation.

DR. WADSWORTH stated that he had only one case in which he had performed sclerotomy. This was in the person of a lady who came to him after the second attack of acute glaucoma, and with her vision reduced, as it had been for a number of weeks, to barely more than perception of light. Her pupils were very large, a little irregular, and scarcely affected by eserine. No view of the disk could be obtained. Sclerotomy was done in both eyes downward. The operation was performed as recommended by Wecker, the cut running into the inner surface of the sclera at the bridge even, but not going through it. After the operation there was no prolapsus of the iris. The operation was followed by relief from pain and the clearing of the media, but vision did not improve. The pupils still remained quite large and were drawn a little down, but no prolapse. The patient was a lady of sixty or sixty-five years of age.

DR. F. BULLER remarked that he had seen several cases in the practice of a London physician. He was of the opinion that this physician was in the habit of cutting entirely through the sclera; a staphylomatous protuberance at the seat of incision seemed to be the usual result. The doctor's own experience was confined to only one case. He performed an iridectomy in both eyes at the same time, with the result of making the tension normal. The tension remained normal for months. The patient then began to have spells of dimmer sight, then it would clear up again. This process continued for some weeks, and then he performed a sclerotomy downward, obtaining a very satisfactory result. The obscuration of the sight remained the same as before the operation, now two years ago. A bridge of sclerotic was left undivided.

NOTE ON A CASE OF UNUSUAL ACUTENESS OF VISION, WITH CIRCLES OF DIFFUSION.

BY DR. G. C. HARLAN,

PHILADELPHIA, PA.

THE following case seems worth reporting as a striking illustration of the well-known, but sometimes forgotten fact, that the results of our usual method of testing the accommodation are far from accurate. It is the case of a gentleman, fifty-four years of age, who complained of some asthenopia in sustained work, though for a short time he could read or write with perfect ease and comfort. He was ordinarily using + 2.25 D. for near work, but without any glass could read the finest print fluently at four inches. The ophthalmoscope showed a refraction of + 2.25 D., without astigmatism, and testing with letters at twenty feet discovered a manifest hypermetropia of 2.25 D.

Thus the most careful application of the usual test, *i.e.*, the ability to read fine print with ease, gave an accommodation of 12.5 D. which, of course, is not to be thought of in a man fifty-four years of age. What Czermak calls the "line of accommodation," or "all that part of the visual line within which, for a given state of accommodation, objects can be seen without sensible confusion," was simply unusually extended in his case, on account of a very contracted pupil, and an acquired facility of reading through the partly closed lids.

This patient, if deprived of his lens without disturbance of the pupil, might make a very fair show of accommodation in aphakia, of which Donders says that what we here and there find noted in regard to it "proves only that the writers had no idea of the degree of distinctness of vision, even in imperfect accommodation."

REPORT OF TWO CASES OF CYST OF THE IRIS.

By DR. E. WILLIAMS,

CINCINNATI, O.

THE curability of cysts of the iris by surgical operation, and the destructive tendency of such tumors when left to themselves, are well illustrated by the two following cases. I shall not take up the time of the society by giving the literature of the subject, as that is accessible from other sources, especially by reference to a report of cases of the kind in the *Klinische Monatsblätter* for 1872, by Dr. Rothmund, of Munich. I wish to say simply that the beautiful microscopic sections which I herewith present were made by my partner, Dr. Robert Sattler. One of the best is represented in the attached cut (see opposite page), and shows the entire extent and position of the cyst-wall. Whatever the origin of this tumor may have been, it does not seem to have originated by sacculation, as the pigmented stroma of the iris is perfectly traceable underneath the cyst-wall throughout its entire extent. One of the sections passed through the shot, which was lodged near the cyst, and the brilliant cut lead surface shows in the preparation.

The little boy, whose eye was saved by a second and very extensive surgical operation, is still doing well, and enjoys useful vision in the eye.

Albert G., aged twenty-five. About eight years ago, while out on a hunting expedition with his friends, he accidentally received a volley of bird-shot in the face and scalp, a number also penetrating the left eye, and resulting in immediate loss of vision.

The inflammatory reaction on the part of the eye was not severe, and did not entail a lengthy or painful suffering; he recovered in three or four weeks, to again resume his duties; his vision, however, was reduced to the perception of light and of movements of large objects.

During the intervening years nothing abnormal, either in appear-

ance or comfort of the eye, was noticed, except that vision was reduced and a slight divergence existed, and also a slight irregularity

Vertical section through upper portion of Iris cyst.

C H Holmes del

of the pupil—in the patient's own words, "A very little blister near the inner border of the pupil."

Eight weeks ago, without any assignable cause, he suffered discomfort and pain, which increased, together with redness and injection of the globe, ciliary neuralgia, luminous appearances, etc. The appearance of the eye also changed greatly; the pupil—the patient's own words—"was destroyed and pushed" outward, and the little blister increased to the size of a bean. The pain increased, and, two weeks before his visit to the office, symptoms of sympathetic irritation of the other eye became manifest.

Stat. præs.—Left eye: intense episcleral injection of globe. In the ciliary region of the sclera, on a line with the horizontal meridian, and about 3 mm. from the sclero-corneal border, is found a black point, marking either the point of entrance, or the lodgement of a shot which had penetrated in some other part and had caused a thinning of the sclera at this point. No other points of entrance or exit could be discovered. T.+. Pain severe, with paroxysmal exacerbations. Eye painful on pressure. Sympathetic irritation of fellow eye. The inner half of the iris is the seat of a cystoid enlargement, which completely fills the inner half of the anterior chamber, and is in contact with the cornea in front and lens behind. The point of origin of the cyst seems to be the inner and upper quadrant of the iris. The walls of the cyst are very thin and translucent, and the anterior wall of a light slate color. The cyst projects from the surface of the iris—it is so translucent that the iris-tissue is distinctly visible; only in the upper and inner portion, just underlying the probable point of attachment of the cyst, does the iris and its uveal layer show atrophic changes. In other parts no marked alteration is found.

Ophthal. ex. reveals extensive alterations of the vitreous, large masses of organized exudations, both floating and fixed. Fundus not visible. V.=0. Enucleation April 5, 1880.

Sectio oculi.—The eye, hardened in Müller's fluid, showed no abnormity either in dimensions or shape of the globe. In the sclera, $3\frac{1}{2}$ mm. from the inner corneal border, is found a discoloration and thinning about the size of a millet-seed. Other points were not discovered. The optic nerve was cut off very close to the sclera, and showed a deep excavation.

Equatorial section.—Posterior chamber filled with coagulated and organized vitreous; about two-thirds of the area of the retina detached by a firm sub-retinal exudation. Directly outward and upward from the region of the macula, the retina, together with a firmly organized mass of lymph, is adherent. Examination reveals

a small bird-shot firmly imbedded in organized lymph, and partially forced through the retina and choroid, and in contact with the sclera at this point.

Examination of anterior half of globe; section parallel to vertical meridian of cornea and just external to the outer border of the cyst. Lens *in situ*. The cyst has collapsed, but its dimensions are distinctly traceable. The outer half of the iris shows no alterations. The cyst projects from the outer or superficial structure; its attachment is very near the iris angle; the lower, but more especially the upper and inner quadrants, show evidences of atrophic degeneration. The uvea is everywhere present, but immediately under the probable point of attachment it is perceptibly atrophied. Some distance below the point of alteration in the sclera is found a shot intimately in contact with the ciliary body and surrounded by organized lymph.

A. W., aged nine years. Two years ago the right eye was injured by an angular piece of slate, resulting in a penetrating vertical wound of the cornea parallel to the vertical meridian, and extending from the sclero-corneal border almost to its centre.

The inflammatory reaction was not violent, and the eye recovered with a linear incarceration of the iris in the corneal cicatrix. Several months afterward the eye became irritable to light, together with discomfort and greater impairment of sight. These paroxysms were never violent, and recurred at variable intervals. Some months prior to his visit the father noticed a slight colored projection from the corneal scar and extending toward the pupil. This increased steadily, and on his first visit, March, 1879, a lobulated cyst of the iris, the largest division on the outer and the smaller on the inner side of the corneal cicatrix, was distinctly visible. The eye was free from irritation. T. not increased, and vision moderately good.

March 18th.—Removal of cyst by a peripheral linear incision with v. Graefe's knife. The cysts encroached so thoroughly on the iris angle that in making the incision it immediately collapsed. An attempt was then made to seize the outer division of the cyst and adjacent iris, and this was most effectually accomplished; the inner division collapsed, and the corneal scar and firmly adherent iris, and small sclero-corneal incision, prevented the introduction of the forceps, and its removal was therefore abandoned. Little or no reaction followed, and in July, 1879, a large coloboma of the iris existed outward, with no trace of the cyst on the outer side of the corneal

scar, but with a distinct nodular translucent elevation about the size of a grain of wheat on the inner side. T. not increased. No pain. From this time the cystoid enlargement continued steadily to increase, with occasional paroxysms of discomfort, photophobia, and progressive impairment of sight.

In January, 1880, the cyst again consisted of two divisions, filling about one-half of the anterior chamber, and leaving only a narrow rim of iris above.

Removal was again urged. A large and free peripheral incision was made directly downward. The incarcerated iris was seized between the arms of a strong iris-forceps, and with gentle traction detached from the cornea, and the angles of the round wound were then carefully freed from iris-tissue. Recovery was not impeded, and a smooth and regular wound resulted, with complete disappearance of the cyst.

April, 1880.—Eye free from all injection. Has not suffered the slightest pain or discomfort. Very narrow border of iris visible above. Lens clear. Fundus visible and perfectly normal. V. = $\frac{1}{10}$, with stenopaic, $\frac{15}{50}$—.

REMARKS.

DR. KNAPP remarked that he had removed a large cyst of the iris from a patient a year ago, and that last week the same patient returned to him having developed a second cyst, no bigger than a pin-head, some distance from the seat of the original. The second cyst was perfectly circumscribed, having a distinct wall. It simulated a cup-like excavation in the iris, which was completely empty. He removed it, making, with a lance-shaped knife, an incision close to the border of the cornea. Then by pressure upon the eye the cyst was forced out, appearing as a transparent bead of vitreous. Afterward the iris was made to prolapse, so that the bottom of the cyst, with the adjacent iris, was removed. After the healing process was complete, there remained only a very small coloboma. The cyst itself showed the iris-tissue very plainly, and over the surface of the iris a single layer of epithelium was nicely defined. The cyst was wounded with the knife in its removal. Dr. K. had removed other cysts, without injury to them, by the knife. He thought there was no doubt but that these cysts originated from the epithelial layer of the iris. There might be a folding-in of the iris to a very slight extent, forming a serous cavity which enlarged, and ultimately became recognizable as a cyst. Whether in the case referred to by him the cyst was the result of transportation of cells, or of sacculation, he could not say.

The PRESIDENT remarked that he had had occasion within the last

two years to operate for a congenital cyst of the iris. The patient continued well for a long time, and though sympathetic trouble of the other eye was threatened, no secondary degeneration occurred.

DR. KNAPP stated that he had reported a case in which the cyst originated in a scar from a foreign body in the vitreous. Six years after the successful removal of the foreign body the cyst made its appearance. It was cut out, but returned about a year later. It was removed again. The operation was rather a desperate one. With the forceps and scraping-hook Dr. Knapp cleansed the sinus of the anterior chamber most thoroughly. This was a very tedious performance. The case did well, and it was now more than a year since the operation. The eye was in good condition, and there were no signs of a return of the trouble.

DR. BULL remarked that about a year ago he removed a cyst for capsular opacity. The pupil was only movable above; vision $\frac{20}{30}$. An incision was made and he endeavored to cause prolapse of the cyst, but, failing in this, he entered the eye, bringing the iris out, which included the cyst with it. Upon examination he then found that the capsule was entirely opaque. The explanation of the origin of this cyst was the same as that given by Dr. Knapp, namely, a simple prolapse including the epithelial surface of the iris, which finally resulted in the production of a cyst.

DR. E. WILLIAMS inquired if, in the case just reported, the capsular opacity was the size of the cyst.

DR. BULL replied that it was.

DR. KIPP remarked that he had had a case of cyst of the iris which was cured spontaneously. A girl was shot in the eye with a number of small bird-shots, one of which still remained in the lower part of the anterior chamber, and had been there two years without causing any disturbance. Last year a small cyst developed in the upper part of the iris, close to the wound of entrance of the shot in the sclero-corneal margin, and an operation was advised. The patient did not return for a time, and in four weeks more it had disappeared. In this case Dr. Kipp thought he could distinctly see a separation between the layers of the iris, indicative of the epithelial origin of the cyst. By means of oblique illumination he could see quite through it.

DR. AGNEW remarked that we all knew that the general indication in removing a cyst of the iris was to postpone its rupture as long as possible, and to remove the cyst with the piece of the iris upon which it was implanted. Finding it somewhat difficult to make a wound with a knife sufficiently large to permit the easy extrusion of the cyst, he had been in the habit of making a wound in the cornea large enough to admit the blade of a pair of probe-pointed scissors. Having done this he passed one of the blades of the scissors into the anterior chamber, avoiding, if possible, the region of the cyst, and thus completed the wound. It was very difficult to get a sufficiently large opening into the anterior chamber to admit of the easy removal of the cyst before it ruptured.

DR. KNAPP remarked that in other tumors of the iris he felt that necessity, but, instead of making an opening in the manner described by Dr. Agnew, he took a narrow v. Graefe's knife to make the incision, which being done, he completed the operation after Streatfield's way of operating for cataract.

The PRESIDENT said that he had found it a useful mode to take a pair of scissors curved on the flat, and to have both points very sharp, which would enable the operator to work with great facility. With these scissors one could cut more than two millimetres at a time and could go half way around the cornea.

THREE CASES OF PERSISTENT PUPILLARY MEMBRANE.

BY DR. C. R. AGNEW,

NEW YORK.

CASE I.—R. A., a boy seven years of age, was referred to me by Dr. R. F. Weir, for divergent strabismus of his left eye. The vision of his right eye was found to be $\frac{20}{xx}$, and that of his left $\frac{20}{c}$. The refraction, as determined by ophthalmoscopic tests, was: right eye, H. $\frac{1}{24}$; left eye, H. $\frac{1}{16}$.

In the right eye there was a small opacity on the posterior capsule of the lens a little to the nasal side of its centre, probably a remnant of the hyaloid artery. The left eye presented a beautiful specimen of persistent pupillary membrane, a condition which the picture of the eye, on opposite page, by Dr. C. Heitzmann, represents far more faithfully than I can describe it in words.

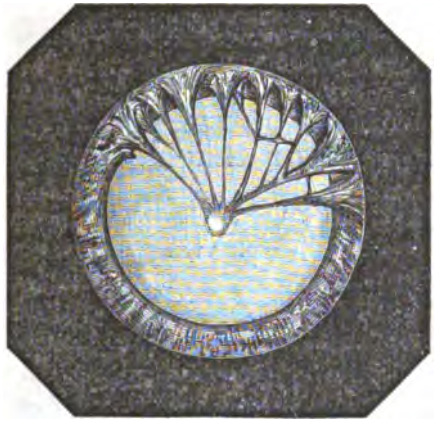
The mother of this child was examined with the ophthalmoscope. Her right eye was found to be myopic $\frac{1}{3}$, and her left myopic $\frac{1}{2}$. Both eyes presented extensive staphyloma posticum.

CASE II.—J. E. W., a married woman, sixty-two years of age, consulted me on account of "a disagreeable feeling as of sticks in the eyes."

I found: right eye, vision $\frac{20}{xl}$ without a glass, made $\frac{20}{xx}$ by $+ \frac{1}{24}$; left eye, vision $\frac{20}{xl}$, made $\frac{20}{xx}$ by $+ \frac{1}{16}$. Ophthalmoscopic examination revealed the presence of numerous dust-like opacities in the peripheries of both lenses, and abundant floating specks in the

anterior portion of the vitreous humor of both eyes. There were also to be seen in the left eye a few delicate, thread-like opacities attached to the sphincter iridis, and extending across the nasal margin of the pupil, and anastomosing with one another.

CASE III.—S. M., artist, thirty years of age, states that two weeks ago the lower "wisdom-tooth," on his right side, became ulcerated,



and he abused his eyes by working for hours in succession by a magic lantern; the next day or two he worked on buff paper without a lamp. For the last three or four days his right eye has felt "swelled," and the vision has become somewhat obscured. The eye is painful afternoons.

The usual tests show:

Right eye, V. $\frac{20}{xxx}$; $\frac{20}{xx}$ with $+\frac{1}{48}$ s. $\supset$ $+\frac{1}{60}$ c. ax. 90°.

Left eye, V. $\frac{20}{xx}$; improved by $+\frac{1}{60}$ c. ax. 90°.

Ophthalmoscopic examination shows small, bead-like, floating bodies in the right vitreous. In the left eye there is a single slender filament attached at both ends to the pupillary edge, and extending downward and outward across the temporal portion of the pupil—undoubtedly the remains of the fœtal pupillary membrane.

After some weeks' rest and the use of atropine in the right eye, with colored glasses, the floating, bubble-like opacities disappeared. Mr. M. was then found to have vision $\frac{20}{xlix}$ in both eyes, with $+\frac{1}{60}$ c. ax. 90°, which glasses were ordered.

It is remarkable that in all three cases reported above the *mem-*

brana pupillaris perseverans affected only the left eye. Also, all the cases were hypermetropic.

The first case illustrates a fact in heredity which I have frequently observed, namely: that where the refraction of the parent is abnormal the refraction of the child is likely also to deviate from the normal type, but may be the reverse of that of the parent.

THE INSUFFICIENCY OF THE OPHTHALMOSCOPE AS THE SOLE TEST OF ERRORS OF REFRACTION.

BY DR. C. R. AGNEW,
NEW YORK.

IN the *Boston Medical and Surgical Journal* for June 24, 1880, occurs a letter from Dr. Hasket Derby, entitled "Near-Sight in the Young," in which he replies to a communication to the same journal, under date of June 17th, from Dr. David Webster. It is not our intention to discuss the questions alluded to in the first portion of Dr. Derby's letter, but to reply to its closing paragraph. The paragraph is as follows: "Dr. Webster's concluding statement, that atropine will reveal a condition of the refraction which the ophthalmoscope has failed to discover, is so utterly opposed to general experience as to require no special refutation. The doctrine of the ability of the ophthalmoscope to determine the optical condition of the eye, first announced by Helmholtz, the inventor of the instrument, and confirmed by Mauthner in his brilliant treatise, may be said to be universally accepted. At the last meeting of the American Ophthalmological Society, Dr. Agnew gave utterance to views similar to those here put forth by Dr. Webster. Unless I am much mistaken he was found to stand alone in their advocacy, and was at once contradicted by Dr. Knapp."

It is true that we did, in the meeting alluded to, make a few brief remarks in asserting the insufficiency of the ophthalmoscope as the sole test of ametropia, in commenting upon the results which Dr. Derby presented to the Society of his examination of the eyes of the students of Amherst College. We contended that it is often impossible, however skilful the observer may be, to determine either the

quality or the quantity of the error of refraction with the ophthalmoscope alone, while the accommodation of the eye under observation is actively at work, and that the observer is by no means sure that the kind or amount of apparent ametropia is really what the ophthalmoscope seems to show it to be.

Hence, in many cases of asthenopia, the only safe way to study the refraction is to pursue the following method :

1. To examine the eyes first with the ophthalmoscope, and at the moment record the result.
2. To make the glass-test next and record its result.
3. To bring both eyes fully under the influence of atropia.
4. To test the eyes with the ophthalmoscope again, the eyes being under the influence of atropia.
5. To make a second glass-test, the eyes being under the influence of atropia.
6. To test the eyes with the ophthalmoscope and glasses at the end of ten days or two weeks, or when they shall have recovered from the effects of the atropia.

By recording the results of the ophthalmoscopic tests before making glass-tests, the observer gets the objective symptoms without any probability of the statements of the patient producing the slightest prejudice in his mind.

By such careful procedure, and by such alone, so far as our experience goes, may we safely deal with the apparent errors of refraction which occur in persons between the ages of ten and thirty-five years of age. We did not find this out till persons returned to us with unsatisfactory glasses which we had fitted after glass-test and ophthalmoscopic test alone, without atropia, or till we began to hear from our colleagues concerning cases of asthenopia which our glasses had not relieved, but which those selected by them had. Atropia had enabled them to discover and correct a variation in ametropia, which our glass and ophthalmoscope tests alone had not revealed. We do not say that we are necessarily to fit a glass, in all cases, to the ametropia which is revealed after full nullification of accommodation. Sometimes we may in myopia or in hypermetropia, where the asthenopia cannot be relieved short of a sharp correction of the extreme amount of ametropia. This is notably necessary in cases in which insufficient and otherwise erroneous correction has been made by the patient selecting his own glasses, by the optician giving over his counter

those which seemed to be best, or by the physician selecting them by a glass and ophthalmoscopic test without atropia.

The safest, and therefore the best way to make the diagnosis in asthenopia is to record the *data*, as indicated in the six steps above, and to give the glass, or correction, which embodies the results of all the steps. As an extra precaution the observer should record the data of his ophthalmoscopic tests *before* he makes any glass-tests.

We have had a patient, a college student, come to our office wearing *minus* elevens, which he had selected by the aid of an optician as those with which he seemed to be able to see best, far and near, who turned out, after thorough saturation of his ciliary muscle with atropia, to be largely hypermetropic, so Titanic was his spasm of accommodation.

We must not turn to the fathers of ophthalmology in any spirit of abject submission to their dicta. We must show ourselves worthy of our parentage. We must cultivate the same spirit of independent research which enabled them to do so much. They, by precept and example, bid us search for facts, and to use facts in a logical way.

Ophthalmology, however vast its progress since 1855 under the impetus given by Helmholtz, Donders, Von Graefe, Arlt, Bowman, and others, is not a finished science or art. Immense results yet await us, and in no domain are we to expect more than in that of *clinical observation;* and who is to say, if we are really moved by the animus of the fathers, whether we may not at noon-day see some things which they did not discover, or draw deductions which may vary greatly from those which they derived.

It will put a stop to science and art, as it has before now to good movements in the domain of morals and religion, if we submit in any spirit of servile subjection to the dicta of the fathers. Then, moreover, we may misinterpret or misrepresent the fathers, and thus embarrass our exercise of the natural and inalienable right of free thought, which they by their example have constantly encouraged us to value and use.

As we must bring the matter, however, to a clinical test, we take from our case-book, in the few hours which have intervened since the letter alluded to fell under our observation, the following brief cases, and for the labor of the collection we are indebted to Dr. D. Webster.

CASE I.—G. K., aged twenty-two, bookkeeper. Became cross-eyed at the age of four. Was operated upon by Dr. ——, first upon

the right eye, and a year later upon the left eye. Has since then been much annoyed by diplopia.

R. V. = $\frac{2}{20}$: Hm. $\frac{1}{36}$.
L. V. = $\frac{2}{20}$: Em.
Insufficiency of int. rect., 24° at 20′.
" " ext. " 13° " 1′.

Ophthalmoscopic examination: nasal edges of optic disks pigmented; choroidal field marked by deep pigment-streaks. Right, hypermetropic $\frac{1}{48}$. Left, emmetropic.

As the diplopia was, at times, very distressing, and produced confusion and much asthenopia, we sent the patient to get the advice of Dr. ——, and also of Dr. ——, two of our most skilful colleagues, and we give their written replies verbatim.

Dr. —— says: "Nov. 7, 1873. This case of K. is one where the squint was due to extremely weak externi, especially of the right eye, and now he has insufficiency of interni for the whole horizon, far and near. When he looks at the finger held within three inches he seems to converge to excess, but careful tests with prisms and a candle show that at this place there are extremely divergent double images, amounting to about 40° prisms, bases inward. To account for this anomaly there must be a fault of projection in the right eye, which came from the prolonged period of squint, by which some other spot of the retina than the macula took on its functions, and he doubtless had, as some do, binocular vision with squint. He now fixes, sometimes with one eye and sometimes with the other, but always with the physiological conditions of divergence. I find in the right eye weakness of externus and also of internus; in left eye weakness of externus and not much of internus. He had better have converging squint than his present state; but to cut one externus would aggravate the state of general tremulousness which now affects the right eye. I would therefore not do an operation of any kind—the only one which I would consider physiological being to advance one or both recti interni and produce squint. But now I would correct his hypermetropia, which in the right is $+\frac{1}{18}$ and in the left $+\frac{1}{36}$, would cover up and throw out of use the left eye, and make him practise the right eye, and after six months see what has been gained. He should use the right eye for half of every day. I am very glad to see this case. It has been a refreshing puzzle, and this is my solution. I have not time to copy this, but desire to have a copy at your convenience, which I will take.

"Yours ever, ——."

Dr. —— comments on the same case as follows, and we give his entire note verbatim, simply suppressing the full name of the patient:

"NEW YORK, November 8, 1873.

"C. R. AGNEW, M.D.:

"*Dear Doctor*—In examining K.'s eyes I find that by +50 cyl. axis upright, S. from $\frac{20}{30}$ and $\frac{20}{40}$ is improved to $\frac{20}{20}$ in either eye. With the ophthalmoscope I find the eyes emmetropic. There is some dynamic and ordinary convergence left, but the crossed double images are distinct. The squinting eye, therefore, had another centre of binocular fixation in the inner half of the retina. This condition of projection, undoubtedly acquired before the operation, still exists. The movements of the eyes could not be better. With regard to further details and prognosis, I should like to speak to you on our next meeting. As to treatment, I would recommend the use of the above-mentioned cylindrical glasses.

"Yours truly, ——."

The glasses recommended by the latter, as the patient desired to try them, were ordered, and the case went from under observation. He returned, however, April 24, 1878, more than four years afterward, stating that he had been troubled by diplopia and pain, "and seeing black and white, kind of peppery" (possibly a conventional phrase for circles of dispersion), since he had worn the cylindrics, just about as much as before. Has been benefited by the glasses only by seeing more distinctly. Vision, however, is now, without glasses, $\frac{20}{30}$ each—an apparent reduction. As the distress of the patient was so great, we determined to do what we should have done before, namely, to nullify the accommodation by atropia.

A solution of sulphate of atropia, four grains to the ounce, was therefore dropped into the eyes five consecutive times, and he was kept in the office during the morning under observation till the full physiological effects were obtained.

He was then examined with glasses, and found to have the following total errors of refraction:

R. V. = $\frac{20}{20}$ with $+\frac{1}{18}$ s. $\frown$ $+\frac{1}{30}$ c. ax. 95°.
L. V. = $\frac{20}{20}$ with $+\frac{1}{18}$ s. $\frown$ $+\frac{1}{42}$ c. ax. 90°.

May 9th.—Fifteen days afterward he returned, the atropia effect passed off, and reported "eyes never felt better than during the last week," or the period of lessened accommodation.

Examination with glasses now showed:

R. V. = $\frac{20}{20}$ with $+\frac{1}{30}$ s. $\frown$ $+\frac{1}{48}$ c. ax. 90°.
L. V. = $\frac{20}{20}$ with $+\frac{1}{36}$ s. $\frown$ $+\frac{1}{48}$ c. ax. 90°.

Which glasses were ordered for constant use.

April 27, 1880.—Returned after an absence of a year, and reports "very much troubled by double images; catches a double object which flies back to a single one, and so it goes, first double and then single, and is very annoying. Loses the place in reading, and the annoyance is at all distances."

R. V. = $\frac{20}{20}$ with $+\frac{1}{24}$ s. $\frown$ $+\frac{1}{48}$ c. ax. 90°.
L. V. = $\frac{20}{20}$ with $+\frac{1}{24}$ s. $\frown$ $+\frac{1}{48}$ c. ax. 90°.

Ordered the above ground upon prisms of $2\frac{1}{2}$° for each eye, base to nose, to be worn constantly.

April 30th.—Has worn the above glasses since he obtained them, with relief.

Now, the above is a case in which Dr. ——, our second correspondent, concluded, after ophthalmoscopic examination, that both eyes were emmetropic, although both accepted a + cylindric in the glass-test. Dr. Webster and myself found that the right eye, under glass-test, had a manifest hypermetropia of $+\frac{1}{36}$, and that the left eye was emmetropic—that is, refused a $+\frac{1}{72}$, or $-\frac{1}{72}$; that the right eye, under the ophthalmoscope, was $+\frac{1}{48}$ hypermetropic, and the left eye emmetropic. Dr. ——, our first correspondent, found the hypermetropia to be $+\frac{1}{18}$ in the right eye, and about $+\frac{1}{36}$ in the left eye, but does not say whether with glasses or the ophthalmoscope, or with both.

Under atropia, Dr. Webster and I found the eyes as follows:

R. V. = $\frac{20}{20}$ with $+\frac{1}{18}$ s. $\frown$ $+\frac{1}{30}$ c. ax. 95°.
L. V. = $\frac{20}{20}$ with $+\frac{1}{18}$ s. $\frown$ $+\frac{1}{42}$ c. ax. 90°.

And after the eyes had recovered from atropia, and the snarl been, as it were, taken out of the accommodation, the apparent ametropia:

R. V. = $\frac{20}{20}$ with $+\frac{1}{30}$ s. $\frown$ $+\frac{1}{48}$ c. ax. 90°.
L. V. = $\frac{20}{20}$ with $+\frac{1}{36}$ s. $\frown$ $+\frac{1}{48}$ c. ax. 90°.

Now, we trust it is unnecessary to say that we do not give these details to attract attention either to our own mistakes or to those of our colleagues, but simply to show what may happen in the experience of men whom every competent judge confides in, and whose studies with glasses and the ophthalmoscope are probably as

acute and painstaking as possible, and in whose decisions, in cases of asthenopia, Helmholtz and Mauthner would doubtless cheerfully acquiesce.

The case is probably not yet cured, and will, more than likely, sooner or later overcome his extreme aversion to a convergent squint, and yield to the wise suggestion of our colleague, Dr. ——, the first correspondent.

The following cases of apparent myopia are also of value:

CASE II.—Mrs. M. R., aged thirty-four years; asthenopia, June 10, 1880.

R. V. = $\frac{20}{40}$: with $-\frac{1}{36}$ c. ax. 180° V. = $\frac{20}{20}$.
L. V. = $\frac{20}{30}$: with $-\frac{1}{42}$ c. ax. 180° V. = $\frac{20}{20}$.

Ophthalmoscopic examination: apparently myopic astigmatism.

Advised to submit to atropia.

July 13th.—Has used a solution of sulphate of atropia of the strength of two grains to the ounce three times a day for two consecutive days.

R. V. = $\frac{20}{20}$ with $+\frac{1}{42}$ s. $\frown$ $+\frac{1}{30}$ c. ax. 90°.
L. V. = $\frac{20}{20}$ with $+\frac{1}{42}$ s. $\frown$ $+\frac{1}{30}$ c. ax. 90°.

Ophthalmoscopic examination under atropia: as above, hypermetropic astigmatism.

CASE III.—J. K., a girl, aged twelve years, has for a year and a half suffered from blurring of vision and pain over the eyes.

October 21, 1879.—

R. V. = $\frac{20}{40}$: with $-\frac{1}{24}$ V. = $\frac{20}{30}$.
L. V. = $\frac{20}{50}$: with $-\frac{1}{24}$ V. = $\frac{20}{30}$.

The ophthalmoscope shows small crescent of choroidal atrophy at temporal edges of disks, and apparent myopia. It seems less than $-\frac{1}{24}$, however.

Ordered atropia and colored glasses.

November 12, 1879.—The atropia was used sixteen days, and stopped six days ago.

R. V. = $\frac{20}{20}$ with $+\frac{1}{24}$
L. V. = $\frac{20}{30}$ with $+\frac{1}{24}$

Instead of an apparent myopia of $-\frac{1}{24}$, the child now has a manifest hypermetropia of $+\frac{1}{24}$; ordered $+\frac{1}{24}$ for constant use. The case

may safely be regarded as one in which a progressive myopia was being developed in hypermetropic eyes.

CASE IV.—February 15, 1878.—T. H., an architect, aged seventeen, complains that the steady use of his eyes at his drawing and in reading produces dimness.

R. V.=$\frac{2}{40}$: with $-\frac{1}{48}$ V.=$\frac{2}{20}$.
L. V.=$\frac{2}{40}$: with $-\frac{1}{60}$ V.=$\frac{2}{20}$.

Ophthalmoscope: emmetropic, both. Ordered atropia.

February 16th (the next day).

R. V.=$\frac{2}{20}$ with $+\frac{1}{20}$.
L. V.=$\frac{2}{20}$ with $+\frac{1}{36}$.

Atropia continued daily.

February 19th.—

R. V.=$\frac{2}{20}$ with $+\frac{1}{18}$.
L. V.=$\frac{2}{20}$ with $+\frac{1}{20}$.

March 1st.—Effects of the atropia passed off.

R. V.=$\frac{2}{20}$ with $+\frac{1}{72}$.
L. V.=$\frac{2}{20}$ with $-\frac{1}{72}$.

But on putting $+\frac{1}{36}$ over both eyes, and compelling the patient to wear them, vision presently became $\frac{2}{20}$. Ordered $+\frac{1}{36}$ for constant use, with the prospect of changing glasses to a nearer approximation to total hypermetropia.

CASE V.—February 7, 1880.—Miss F., aged fifteen, has had recurring styes and blepharitis marginalis, for years.

R. V.=$\frac{2}{30}$: $\frac{2}{20}$ with $-\frac{1}{60}$ c. ax. 180°.
L. V.=$\frac{2}{30}$: $\frac{2}{20}$ with $-\frac{1}{60}$ c. ax. 180°.

Ophthalmoscope: no lesion; both eyes apparently emmetropic.

February 11th.—Atropia gr. iv. to ounce instilled three times in each eye during the morning.

R. V.=$\frac{2}{30}$: $\frac{2}{20}$ with $+\frac{1}{42}$ s.
L. V.=$\frac{2}{60}$: $\frac{2}{20}$ with $+\frac{1}{36}$ s.

An hour later, mouth dry and other signs of complete atropine effect. V.=$\frac{2}{20}$ each eye with $+\frac{1}{36}$.

CASE VI.—March 17, 1880.—P. H. W., a boy aged twelve, complains of near-sightedness. Has some pain after reading a few moments.

Ophthalmoscope: myopia $-\frac{1}{48}$. No staphyloma posticum.

R. V. $=\frac{20}{30}$: $\frac{20}{20}$ with $-\frac{1}{60}$ s.
L. V. $=\frac{20}{30}$: $\frac{20}{20}$ with $-\frac{1}{48}$ s.

March 20th.—Under atropia.

R. V. $=\frac{20}{40}$: $\frac{20}{20}$ with $+\frac{1}{48}$.
L. V. $=\frac{20}{40}$: $\frac{20}{20}$ with $+\frac{1}{48}$.

April 10th.—After effects of atropia had entirely gone, apparent myopia also gone, and replaced by a manifest hypermetropia in each eye of $+\frac{1}{60}$. Ordered $+\frac{1}{60}$ for near work.

CASE VII.—November 27, 1875.—W. B. G., aged twenty-one, complains of black specks before eyes, and defective vision.

R. V. $=\frac{20}{70}$: V. $=\frac{20}{20}$ with $-\frac{1}{30}$ c. ax. 180°.
L. V. $=\frac{20}{50}$: V. $=\frac{20}{20}$ with $-\frac{1}{30}$ c. ax. 180°.

Ophthalmoscope: no lesion; apparently myopic astigmatism.

November 29th.—Ordered $-\frac{1}{36}$ c. ax. 180° for both eyes, to be worn constantly.

May 22, 1878.—"Has failed to use the glasses as much as he should, and does not see as well as he should."

May 24th.—

R. V. $=\frac{20}{20}$ with $+\frac{1}{30}$ c. ax. 90° $\frown$ $-\frac{1}{30}$ c. ax. 180°.
L. V. $=\frac{20}{20}$ with $+\frac{1}{30}$ c. ax. 85° $\frown$ $-\frac{1}{30}$ c. ax. 175°.

June 3d.—Under atropine.

V. $=\frac{20}{20}$ each with $+\frac{1}{24}$ c. ax. 90° $\frown$ $-\frac{1}{24}$ c. ax. 180°.

June 17th.—

V. $\frac{20}{20}$ each with $+\frac{1}{30}$ c. ax. 90° $\frown$ $-\frac{1}{30}$ c. ax. 180°.

Atropia effect passed off. Ordered the above for constant use.

CASE VIII.—Apparent emmetropia with the ophthalmoscope.

August 10, 1878.—W. R. P., aged twenty-nine, clerk, had some trouble with his eyes in 1860, which the doctor called "weakness of the optic nerves," and, though temporarily benefited by tonics and attention to his general health, the weakness of the eyes has continued. They ache on use and whenever he gets fatigued.

R. V. $=\frac{20}{30}$: V. $=\frac{20}{20}$ with $+\frac{1}{60}$ c. ax. 90°.
L. V. $=\frac{20}{30}$: V. $=\frac{20}{20}$ with $+\frac{1}{60}$ c. ax. 100°.

Insufficiency of the interni 4° at 1′, and of the externi, 1° at 20.

Ophthalmoscope: no lesion; both eyes apparently emmetropic.

August 14th.—After three instillations of a four-grain solution of atropia, and waiting three hours:

R. V. = $\frac{20}{20}$ with + $\frac{1}{14}$.
L. V. = $\frac{20}{20}$ " + $\frac{1}{10}$.

August 28th.—Effects of atropia having passed away:

R. V. = $\frac{20}{20}$ with + $\frac{1}{24}$.
L. V. = $\frac{20}{20}$ " + $\frac{1}{24}$.

Which were ordered for constant use.

CASE IX.—Largely underestimated hypermetropia with the ophthalmoscope.

October 16, 1877.—C. W. L., aged twenty-seven, has had inflammation of edges of eyelids for three years. The more he uses the eyes, the more irritable the lids become. V. = $\frac{20}{20}$ each; cannot read $\frac{20}{20}$ through + $\frac{1}{72}$ with either eye. No muscular insufficiency.

June 13, 1878.—V. = $\frac{20}{20}$ each; cannot read $\frac{20}{20}$ through + $\frac{1}{72}$ with either eye. Ophthalmoscope: slight hypermetropia; no lesion.

After instillation of atropia thrice, and waiting one hour:

V. = $\frac{20}{20}$ with + $\frac{1}{36}$ s. ⌒ + $\frac{1}{60}$ c. ax. 180° each.

CASE X.—Hypermetropia largely underestimated with the ophthalmoscope.

March 2, 1878.—Mrs. J. M. G., aged twenty-nine, has had for a year an itching and burning sensation in the eyelids, with occasional blurring of the sight. Some pain also, and soreness of the eyes. For the last eight or ten years has had frequent attacks of severe headache, confined to the left side of the head and the left eye. These attacks have increased in frequency, and of late occurred as often as once a week.

V. = $\frac{20}{20}$ each: + $\frac{1}{72}$ blurs each eye. Ophthalmoscope, apparent hypermetropia + $\frac{1}{48}$ each, and small central or physiological excavation of the disks.

After two instillations of atropia, and waiting:

R. V. = $\frac{20}{20}$ with + $\frac{1}{15}$ s. ⌒ + $\frac{1}{48}$ c. ax. 90°.
L. V. = $\frac{20}{20}$ with + $\frac{1}{14}$ s. ⌒ + $\frac{1}{48}$ c. ax. 90°.

It may be said that such cases are rare and exceptional, and that in the vast majority of cases of asthenopia we are justified in prescribing after a glass and ophthalmoscopic test. That may be so,

but we are bound to confess that we have never had occasion to regret the more thorough method of the threefold glass and ophthalmoscopic test applied before, during, and after atropia, and to affirm that the inconvenience to the patient of having the accommodation suspended for several days is as nothing compared with the doubt which so frequently clings to the prescription of glasses without the factor which the entire nullification of the accommodation alone admits of. Especially is this true as regards the classes of eye-workers in school and professions. The proper selection of a pair of glasses in such cases is often of unspeakable value. It often determines the question whether a student should turn from a chosen vocation, upon which he may have already spent much time and effort, to an avocation for which he has no taste or aptitude.

The few days of inconvenience resulting from the use of atropia is as nothing compared with its possible and probable advantages. Moreover, it is not unfrequently in cases in which your glass and ophthalmoscopic tests seem to be most conclusive that a mistake may arise.

We trust that we need not say that we are expert in the use of the ophthalmoscope, or that we are not. Our colleagues must judge. They have often done us the credit, however, of saying that we were. This much we do know: that we have not unfrequently made mistakes in determining errors of refraction with the ophthalmoscope alone. We have heard of it through the kindness of our colleagues, and occasionally through the complaints of patients. We have known the best skilled of our colleagues to make similar mistakes, and we are not sure that our being allowed to "stand alone" in the advocacy of the views advanced in this communication was not more due to the want of time for confessions all around the circle than from any inherent heresy in the views themselves.

Are we, then, to be charged with undervaluing the ophthalmoscope as an instrument for studying the means of refraction? By no means. Its value will be all the greater if we studiously limit, or guard, its application, and test its revelations by every possible clinical method. If we rely upon it with anything resembling abject or servile subjection we may be deceived, especially if we cripple ourselves by drawing false conclusions from the apparent dicta of the fathers. Much as we love the latter we must remember that they nowhere claim infallibility, and that our filial loyalty will be best proved by reverently reaching out on all sides for the truth, for the truth's sake; and we may find it, at times, apparently

against some of the dicta of past experience. But in our remarks, as well as in this brief clinical paper, we are advancing no new doctrine, much less promulgating heretical opposition to the teachings of authorities. Were it in keeping with the simple purposes of this brief clinical paper, we might go back over the proceedings of the American Ophthalmological Society, and cite from them, as, indeed, from other current ophthalmic literature, to prove that several of our colleagues have already touched on the same theme, and, therefore, made it apparent that we did not "stand alone." The cases cited in this paper run back as far as 1875, and it would be possible to show from our case-book, that, certainly as early as 1873, and perhaps earlier, we were awake to the dangers of trusting too implicitly or blindly to the ophthalmoscope as the sole test of ametropia.

REMARKS.

DR. H. DERBY asked Dr. Agnew whether Helmholtz had not claimed for the instrument "the ability to determine the optical condition of the eye, independent of its visual power or the statements of the person examined."

DR. AGNEW so understood it.

DR. DERBY inquired whether Dr. Agnew did not himself maintain that, in many cases, the true amount of latent hypermetropia could not be ascertained by the use of the mirror only.

DR. AGNEW replied in the affirmative.

DR. DERBY expressed himself as unable to see any agreement between the statement of Helmholtz and the views held by Dr. Agnew.

DR. AGNEW characterized his agreement with Helmholtz as a *substantial* one.

DR. WEBSTER said that what led to this discussion was an article published in the *Boston Medical and Surgical Journal*, in which the author, Dr. Hasket Derby, asserted that near-sight might begin with spasm of the accommodation, and cited, in support of this theory, the case of a student at Amherst College, whose eyes he had found at his first examination near-sighted. One year later he examined him again and found his near-sight entirely gone, and so concluded that when first examined he had been laboring under accommodative spasm. Three and a half years after the second examination he had made a third, and found that "true near-sight, to a considerable amount, had made its appearance, and the ophthalmoscope showed it to be real, and not due to spasm." This case seemed to him (Dr. Webster) inconclusive, as atropine had not been used. The young man might have had a *recurrence* of spasm of the accommodation, in which case the eyes might have appeared to be really near-sighted when examined with the ophthalmoscope, and yet really not myopic, but retaining the same degree of refraction as when examined the

second time. He (Dr. W.) thought that all would agree that where spasm of the accommodation was excluded the true refraction of the eye could generally be very closely approximated with the ophthalmoscope; that those were mistaken, however, who believed that in all cases of spasm of the ciliary muscle the accommodation was sure to become relaxed under the glare of light thrown upon the eye in ophthalmoscopic examination.

DR. AGNEW stated that the title of his paper was, "The Insufficiency of the Ophthalmoscope as the Sole Test of Ametropia in the Diagnosis of Asthenopia." He thought that the majority of cases of asthenopia were entitled to an examination both with the ophthalmoscope and with atropia: first, with the ophthalmoscope and then with atropia; then, after the effect of the atropia has passed off, with glasses and atropia.

Dr. Agnew thought all these means should be employed because he did not know in just what cases spasm of the accommodation could be determined without that sort of an analysis.

DR. KNAPP thought spasm of the accommodation was a rare occurrence; but he concurred with Dr. Agnew, that, in obscure cases of asthenopia, all means at our command for making a diagnosis should be employed.

Dr. Knapp remarked that the use of the ophthalmoscope was certainly not the only means of determining the refraction of the eye, but that it was probably the best. He wished to point out those conditions in which its use would lead to fallacious opinions:

First.—He had committed errors when the relief of the fundus oculi was irregular. *Secondly*, in astigmatism. If we examined the minute blood-vessels—those, for instance, which passed from the disk directly toward the yellow spot, we obtained the refractive condition of a particular meridian only (the vertical, in the above example), and we could appreciate the proper degree of ametropia only by the successive determination of the refraction of fine blood-vessels that showed different directions. The third fallacy was the influence of the ocular muscles upon refraction, particularly in convergent squint, in which, without artificial paralysis of accommodation, we could determine only the far point of the relative accommodation.

NEURITIS AFTER MEASLES.

BY DR. O. F. WADSWORTH,

BOSTON, MASS.

THE occurrence of neuritis optici as a sequela of measles appears to have been so rarely observed, at least so rarely reported, that it may be worth while to put on record the three following cases. The neuritis can, indeed, hardly be regarded as a direct consequence of the disease of measles itself, it is rather to be looked upon as the result of a complicating meningitis. In two of the cases the evidence of the latter disease is patent enough, in the third, however, almost the only sign of cerebral affection is given by the ocular symptoms, and on this account especially is it of interest.

CASE I.—J. H. R., aged four years, was brought to the Massachusetts General Hospital, July 18, 1878, on account of loss of sight, first noticed the day before. He was the second of four healthy children, of healthy parents. The previous winter and spring he had had, occasionally, flushed face and headache, with sometimes vomiting. Aside from this he was well and strong. About the first of June his brother, and soon after his sister, had measles. Some two weeks after the brother was attacked this boy began to ail. For several days he was heavy, complained of headache, vomited, had epistaxis and cough; then a scanty eruption appeared. He was lightly sick some four days longer. The next fortnight he was about, and apparently as well as ever, but during the third week was in bed, face flushed, complaining constantly of headache, twitching in his sleep and starting awake suddenly, saying it hurt him when touched, and vomiting food. Once more he was up and about, seeming well. On the fourth day, however, when he came in to dinner after running about playing with a kite, his mother observed that he groped for his plate on the table. The plate was moved to another part of the table and the boy had great difficulty in finding it. During the following night he was very restless, eat nothing in the morning, and was brought to the hospital.

He was in very good flesh, had fair color, and, except his evident

blindness, showed no sign of sickness. The pupils were large, reacted but little to light. Only the movement of the hand at a short distance could be distinguished with either eye. In each eye the disk was prominent, with striated, grayish surface, the swelling hiding the outline of the disk, but not extending far beyond its border. The central vessels were visible on the surface of the swollen disk and curved sharply down its sides; the veins a little enlarged. No hemorrhages. Remainder of fundus normal. No urine could be obtained.

Two nights afterward there was great restlessness and unwillingness to be touched; in the morning headache and vomiting, and soon he became semi-comatose. Throughout the next day there was slight twitching of hands, feet, and mouth, and for several hours in the following night violent screaming. From this time he improved slowly, and after a fortnight seemed strong, had good appetite, gained flesh rapidly, and was bright and talkative.

On August 17th he was ruddy, stout, and apparently in excellent condition. Vision was entirely wanting; pupils insensitive to light. Swelling of the disks had much diminished, and the grayish striation was giving place to paleness. The outline of the disks was readily seen, though veiled. The arteries were somewhat small. Otherwise fundus normal. Urine normal.

During the next month his general health was very good and he still gained in weight; but he had, both waking and sleeping, occasional attacks of sudden fright, shrieking, with gestures of terror, and saying he saw pigs, dogs, or horses, becoming quiet as soon as touched by his parents.

September 21st, the disks had become sharply defined, white; the main vessels were rather small. Blindness continued. For six weeks longer there were a few attacks of fright, then they ceased. Only once during this time did he complain of headache. After the weather became cool and he was confined to the house he lost his ruddy color, but not his flesh, and had sometimes nausea and vomiting in the morning. Urine examined again in November, was normal. Examination of chest and abdomen negative. Toward the end of January, 1879, when last seen, the disks were a little more gray. There was no other change.

CASE II.—H. G., aged twelve years, was seen in consultation with Dr. H. E. Marion, to whom I am indebted for notes of this case, June 21, 1879. He was one of two children, a sister, younger, having partial paralysis of lower extremities since early in-

fancy. Parents healthy and in comfortable circumstances. The patient had had no serious illness till the present one. About Christmas, 1878, he had measles, from which he was supposed to have made a good recovery; but a month later, the last of January, 1879, he began to complain of occipital headaches, which were followed by vomiting and sleep. In March, headaches became more frequent, and he had often pain in different parts of the body; he began to lose flesh, was disturbed by noise, and would start out of his sleep as if frightened. This condition continued, and early in June it was noticed that he did not see objects readily. Dr. Marion saw him first June 19th, and found V. and F. much impaired; poor appetite, some constipation, urine normal; physical examination of lungs and heart negative.

Two days later I saw him. The pupils were rather large, reacted to light and A. V., R. $\frac{14}{40}$; L. $\frac{14}{200}$. The outer half of each F. was wanting; the inner half was contracted, particularly in the upper part; in the R. a defect of nearly the whole upper and inner quadrant. In both eyes, disks swollen, opaque, the sides of the swelling rather steep, the opacity extending some little distance into the retina, and shading off gradually. Numerous fine vessels on the disks; veins moderately enlarged and winding; both veins and arteries hidden here and there. Opacity a little more marked in L. Near the outer side of the swelling were several small whitish spots in R.; a few similar spots in L. Abnormal reflex in the macular region. No hemorrhages. The boy's walk was a little unsteady, as he said, because he could not see. No staggering with eyes shut and feet together. Dr. M. and I agreed in the diagnosis of meningitis.

For a few weeks headaches were less frequent, his appetite became good, and he began to gain flesh. Then he had severe intermittent pain in the temples, and darting pains about the head, with frequent vomiting. Toward the end of July he had a slight epileptic attack, followed by severe pain in the distribution of the left facial nerve. Noise disturbed him much. The first part of August, Dr. Williams and Dr. Minot saw him and agreed with the diagnosis already made. Sight failed till he could not distinguish light from darkness. August 19th, there was a circumscribed swelling over the anterior inferior angle of the right parietal bone which yielded to pressure, and resumed its shape when pressure was removed. A week later a similar swelling on the left side. He had some hallucinations of sight. Hearing became defective. At times there was severe pain

in the left mastoid region; later, in cartilage of left ear. By September 9th his head had increased in size by measurement. He had occasional convulsive movements. The scalp was tender. By the first of October he could scarcely walk alone; at times much fever; almost complete paralysis of rectum; much difficulty in passing urine. Appetite good, and he slept well.

From the last part of October till he died, December 24th, he was under the care of a Spiritualist in another city. Dr. Marion only learned of his death shortly before the funeral, too late to obtain an autopsy.

CASE III.—M. J. A., three and a half years of age, was sent to me by Dr. Howe, of Lawrence, April 29, 1880. Family history good; she fairly healthy. The last days of March she began to ail; the eruption of measles appeared on the seventh day. For two or three days before the eruption appeared there was high pulse and temperature, and some delirium at night. During the eruption she complained of headache for two or three days, not afterward. While the eruption was fading, marked convergent strabismus appeared, said by the parents to have been at first of both eyes, but more of the right. Shortly after the strabismus was noticed the mother observed that the child, when trying to pick up an object from the floor, would estimate its position wrongly.

For a week or two longer there was anorexia, constipation, and cough, afterward she seemed as well as usual. During the last few days before I saw her, the strabismus had decidedly decreased.

I found a moderate convergence of the right eye, and at least no marked deficiency of excursion. V. could not be determined with any accuracy. The disks were blurred, striated, little swollen; the opacity was enough to hide the outline of the choroidal opening, even with the reversed image, but not the central vessels, and extended over a space of some 2–2½ diameters of the disk. Central vessels of normal size. No hemorrhages.

The child continued well, slept well, gained in weight. When I saw her again, July 10th, the eyes were straight, and, the father said, had been so for six weeks. Every sign of neuritis had vanished; the disks were defined, bright, and of normal appearance. So far as could be determined in so young a child, V. was not affected.

The complication of measles by meningitis does not appear to be a frequent one; much more infrequent is it to have meningitis come on after a period of apparently normal convalescence from measles.

Given the meningitis, and the fact of neuritis has in it, of course, nothing peculiar.

In the first case the symptoms immediately preceding the outbreak of the eruption were hardly enough to have excited suspicion of serious cerebral disturbance; yet it may be that a meningitis existed from the first, becoming latent for a time, then bursting into activity, and again, after a second period of quiet, starting up with more violence than ever.

In the second case there is no history of cerebral symptoms with the attack of measles; only after a period of uninterrupted convalescence did such symptoms show themselves. The question might indeed be raised whether the meningitis was, properly speaking, a sequela of measles and not rather an independent affection. If the case stood alone one might scarcely feel justified in asserting any intimate relation between the two diseases. Taken in connection with other cases, however, remembering that in the first case reported there was a fortnight of apparent good health after not very marked head-symptoms, that this patient had been sick for several months before his history was obtained, and, possibly, some data may have been omitted by the parents, the assumption of direct connection between the measles and the meningitis does not seem unjustified.

The third case is chiefly remarkable for the almost total absence of symptoms of meningitis, except those to be observed in the eyes. But the occurrence of paralysis of the abducens, together with double optic neuritis, can hardly admit of a doubt as to this diagnosis.

REMARKS.

DR. POMEROY remarked that he had a case some time since in which there was atrophy of the nerve and neuritis. The symptoms came on soon after an attack of measles. The pain in the head was relieved by large doses of iodide of potassium, but the neuritis did not improve. The patient was lost sight of. Dr. Seguin, of New York, had seen the case in consultation and threw out of question the probable causation of measles. Both Dr. Pomeroy and Dr. Seguin agreed that there was basal meningitis.

A CASE OF DETACHED RETINA TREATED BY HYPODERMIC INJECTIONS OF MURIATE OF PILOCARPIN.

By DR. JOHN GREEN,

ST. LOUIS, MO.

MARY M., single, aged twenty-one, applied for advice June 13, 1880. Three months before she had noticed a defect in the upper part of the visual field of the right eye. Central vision had remained unimpaired until about May 1st.

V. $< \frac{16}{200}$; fixing a point nine inches to the left and four inches above the centre of the test-letter V. $= \frac{16}{200}$.

A map of the field showed the boundary line of the region of total blindness (as tested by seeing the pencil-point at a distance of twelve inches) passing $\frac{1}{4}$ inch above the point of fixation, and inclined about 160° to the horizontal meridian.

The ophthalmoscope showed a detachment of the retina in its lower half, extending to the level of the macula; near the posterior pole of the eye the detached retina was raised but little from the choroid, but in the lower part of the eye the separation was apparently not less than from two to three millimetres.

Subsequent examinations, made June 2d and 3d, confirmed the measurements of June 1st.

June 3d.—I injected 11 millig. of muriate of pilocarpin, dissolved in half a cubic centimetre of distilled water, beneath the skin of the right temple. Salivation began within two minutes, and became profuse within four minutes. Sweating began at about the same time as the salivation; it was quite decided four minutes, and profuse seven minutes from the time of the injection. The pulse rose in the first two minutes from 76 to 111, from which maximum it gradually fell to 100 in the course of half an hour, at which time the salivation and sweating had both sensibly diminished. At the end of an hour the salivation and sweating were over, but the pulse remained at about 90. The saliva was strongly alkaline, and the quantity ejected during the hour measured 120 c.c. No trace of myosis or of accommodative spasm could be detected at any time.

After the sweating and salivation had ceased, the eyes were care-

fully covered from the light by a bandage of linen covered by black silk. The recumbent position was preserved for two days, after which the patient sat up. The bandage was kept on for four days.

June 14th.—V.=$\frac{1.6}{200}$, central; fixing a point a little to the left of the test-letter, V.=$\frac{1.6}{158}$. A second map was taken of the field of vision, showing that the boundary line of the blind region had risen fully an inch (distance 12 inches).

The injection of pilocarpin was repeated, as nearly as possible as before, and was followed by the same train of symptoms. The patient was kept in bed two days and the dark bandage was kept on three days.

June 21st.—V. as per last record, but the map of the field shows the boundary line two inches above its position the week before, and over three inches above its position as observed on the 1st, 2d, and 3d of June.

A third injection was given June 25th; the patient was kept in bed two days, and bandaged three days.

July 6th.—V. unchanged from last two records, but the blind region has receded a little over two inches more.

July 10th.—A fourth injection was given; patient two days in bed, bandaged three days.

July 16th.—V.=$\frac{2}{12}$, central. A comparison with the map of July 10th shows a further recession of the blind region equal to half an inch, or a total of six inches since June 3d.

[1] [July 28th.—A fifth injection was given in my absence by my colleague, Dr. M. H. Post. A map made by him August 4th appears to show a loss of all that had been gained after the second, third, and fourth injections.

Sixth injection, August 9th, also by Dr. Post. August 16th, map shows a condition somewhat better than that of June 21st.

Seventh injection, August 31st, 16 millig.; patient two days in bed and three days bandaged.

September 7th.—V.=$\frac{1.6}{200}$, central; test-letter more clearly distinguished when a point nine inches to the left and four inches above the letter is fixed. Map of field shows the maximum recession of blind region ever attained, namely, eight inches from the position of June 1st, 2d, and 3d.

November 21, 1880.—V. = $\frac{1.6}{200}$, central, but improved in clearness by looking a little to the left and above. The map shows the posi-

[1] The continuation of the history after the date of the meeting of the society, up to the last observation of the patient, is given in brackets.

tion of the boundary of the blind region about midway between the positions observed June 21st and July 6th. The ophthalmoscope still shows extensive detachment with elevation of the retina in the bottom of the eye, but no detachment can be made out in the neighborhood of the posterior pole, where it was seen in the first examination made in the beginning of June.]

It may be questioned how far, if at all, the treatment in this case has been of positive utility; it was undertaken in compliance with the very urgent desire of the patient to have something tried for her benefit, and under the encouragement derived from a verbal statement to me by the late Dr. Rudolf Gebser, of St. Louis, that he had had the good fortune, apparently, to cure a positive case of retinal detachment by three hypodermic injections of pilocarpin, beginning with $\frac{1}{8}$ grain and increasing the dose to $\frac{1}{4}$ grain.

A noteworthy fact connected with the administration of pilocarpin, whether by the stomach or hypodermically, is the entire absence of any degree of resultant myosis or accommodative spasm.

REMARKS.

DR. PROUT wished to know what would have become of the case reported had it not been for the use of pilocarpin.

DR. GREEN replied that he was perfectly aware that cases of detached retina might recover without treatment. The interesting feature in this case was that a new portion of the retina had evidently recovered its function, in great part at least, after each of the four injections which had been made. The improvement seemed, however, to have been confined to those portions of the retina which had been elevated but little from the choroid. Where the subretinal effusion had been large in quantity no appreciable effect had been produced.

DR. KNAPP remarked that he had seen a patient who had been treated with pilocarpin and eserine by some European celebrity, and who now had a return of the disease.

DR. KIPP stated that he had used pilocarpin in a number of cases, and that in one instance it had been beneficial.

DR. KNAPP thought that the use of pilocarpin or eserine *in the eye*, in cases of detachment of the retina, was contra-indicated.

DR. WADSWORTH announced that he had used pilocarpin in two or three cases of opacities of the vitreous, without any apparent result.

DR. HENRY W. WILLIAMS, of Boston, remarked that since three years ago he had seen an unusual number of cases of episcleritis. There was one case in particular to which he would call attention. The disease had recurred more than once, and lasted for a long time, the patient recovering very slowly, with no special complica-

tions left behind. The young lady going to Europe, had there another attack, and de Wecker, of Paris, cut it short by the use of pilocarpin injections hypodermically. During the summer of 1877 Dr. Williams had seen de Wecker make these injections, and on returning home he had tried them upon several cases with much success, cutting short the attack to a period of two or three weeks. Subsequent experience had confirmed his good opinion of the remedy, and he could add his testimony in favor of its value in that affection.

EXHIBITION OF A COMBINATION SET OF TRIAL-GLASSES, AND A NEW TRIAL-FRAME.

By DR. JOHN GREEN,

ST. LOUIS, MO.

Two years ago I called attention, in this place, to the insufficiency of even the fullest trial-cases of glasses for the accurate measurement of the higher grades of ametropia. Assuming that the common interval between the successive glasses ought not to exceed .5 d. in the higher numbers (say from 4.5 d. to 20. d.), or .25 d. in the lower numbers (say from 0 to 4.5 d.), a full series will contain 50 numbers. Many of these numbers are, however, not to be found in commerce, and must, therefore, be somewhat difficult to procure, as well as costly.

I showed, also, that by making a slight change in the construction of the ordinary brass settings of the glasses and of the trial-frame, it is both easy and convenient to employ glasses in dual combinations, both spherical and cylindrical, and thus to reduce the glasses in the trial-case to a comparatively small number, and those such as can be readily and cheaply procured.

I have now to exhibit two metric trial-cases which I have had made for me, the one by Mr. H. W. Hunter, of New York, and the other by Messrs. Jas. W. Queen & Co., of Philadelphia.

In the former case, made by Hunter, there is but a single glass of each number, viz.:

+ .25, .5, 1., 1.5, 2., 2.5, 3., 3.5, 4., 8., 12., 16., 20.
− .25, .5, 1., 1.5, 2., 2.5, 3., 3.5, 4., 8., 12., 16., 20. } spherical.

+ .25, .5, 1., 1.5, 2., 2.5, 3., 3.5, 4., 8.
− .25, .5, 1., 1.5, 2., 2.5, 3., 3.5, 4., 8. } cylindrical.

46 glasses, of which 26 are spherical and 20 cylindrical.

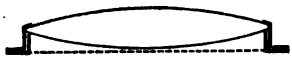


FIG. 1.

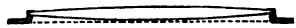


FIG. 2.

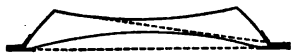


FIG. 3.

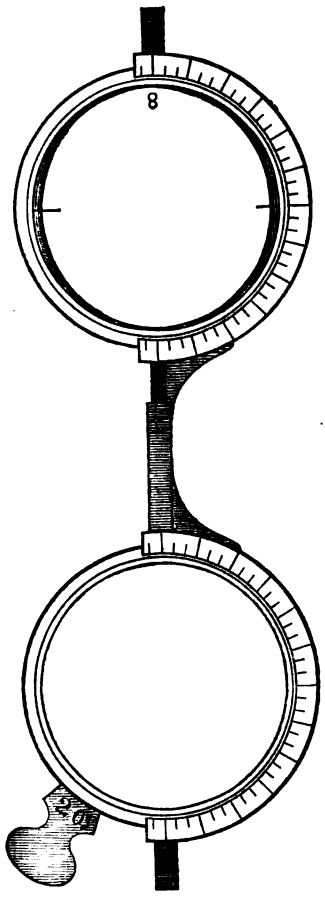


FIG. 4.

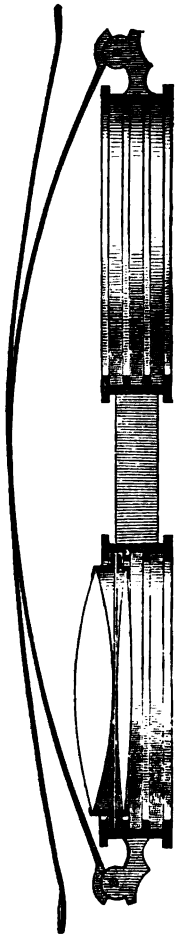


FIG. 5.

The second case, made by Queen & Co., contains the same numbers, but the spherical glasses are in pairs. It contains, therefore, 72 glasses, of which 52 (or 26 pairs) are spherical and 20 cylindrical.

The construction of the brass settings for the glasses is indicated in Fig. 1, which shows a section of one of the stronger convex glasses (20. d.), together with its setting. This is made of such a depth that the plane of the flange just avoids contact with the centre of the lens surface; the flange also is much thinner and deeper than usual. Fig. 2 shows one of the weaker convex glasses, and Fig. 3 a concave glass of 20. d. Fig. 3 illustrates also the mounting of a prismatic glass. By this construction any two lenses from the case may be placed together, flange to flange, without contact of the glasses, and in this position they may be placed together in either of the three grooves of the trial-frame.

The trial-frame, Figs. 4 and 5, is made in the form of two short tubes, from the upper part of which nearly, but not quite, one-half has been cut away; those half-tubes, which are united by an adjustable bridge, are grooved upon the inside so as to present three rather broad grooves, each of which is designed to receive and hold the flanges of two glasses. The three grooves are sufficient for the reception of four of the thickest glasses of the case, say the $\pm$20. and $\pm$16. spherical, and the $\pm$8. and $\pm$4. cylindrical, in which case the combination of strongest glasses will be placed in the groove next the eye, and the second couple in the front groove. In other cases the glasses may be placed in the first and second, or in the second and third grooves at pleasure, according to the distance at which it is desired to set them from the eye.

THE KERATOMETER — A NEW INSTRUMENT FOR MEASURING THE CURVATURE OF THE CORNEA.

BY DR. E. G. LORING,

NEW YORK.

BEAUTIFUL and accurate as is the instrument designed by Helmholtz for measuring the curvature of the cornea, it is nevertheless true that it has been of more value to physiology and science than to practical medicine: first, from the elaborate and expensive character of the instrument; and secondly, from the amount of technical knowledge and experience necessary to obtain with it accurate and satisfactory results.

The practising oculist, therefore, has hitherto had nothing with which he could measure or even form any idea as to the degree of curvature of the most important refracting surface of the eye.

It is to supply this want that the simple and inexpensive instrument now to be described was designed. The instrument consists of a metal disk, in which are set a number of plano-convex lenses of various curvatures, on the plane or posterior surface of which the representation of the iris is painted. The lenses are, in fact, anterior sections of artificial eyes of different curvatures. The number of lenses employed in the present instance is six, but more could be inserted if a smaller interval between them was needed. The radii of these artificial corneæ are, progressing from the longest to the shortest: 8.5; 8.; 7.$\frac{3}{4}$; 7.5; 7.; 6. The manner in which they are set is shown in the accompanying drawing.

As will be seen in most cases, the difference in length of radius or interval between the glasses is equal to half a millimetre. As, however, the radius of the cornea of the vast majority of eyes must lie between 7.5 and 8 mm., this interval has been so subdivided as to give

between these two numbers a difference of radius of one-quarter of a millimetre, or less than $\frac{1}{100}$ of an inch. As, on the other hand, a cornea of less than 7 mm. can only occur as a rarity, the interval between this and the next succeeding glass is 1 mm. The length of the radii is stamped below the glass.

The principles upon which the instrument is based are: first, that the eye is capable of detecting very minute differences in the size of two juxta-opposed bodies, the exact dimensions of which the mind is unable to estimate accurately; secondly, that the size of an image from a convex surface is proportionate to the radius of curvature.

The application, then, of these principles consists in comparing the image of the glass cornea, which has a known radius, with that from the real cornea, which is unknown; or, in other words, in matching the image of the real with that of the artificial eye. When the images are of the same size, then the radii must also be the same.

The application of the test is exceedingly simple. Any object may be taken from which to get a reflected image from the cornea, as, for example, the ordinary window-sash, especially when the white shade with which it is usually provided is drawn down. The patient is placed opposite to this in a chair, and the observer, standing a little on one side, so as not to interpose his body or head between the light and the patient, then places the disk in close application to the outer angle of the eye to be examined. Should the image from the glass selected not correspond in size with that from the cornea, the observer then rotates the disk until the image from the glass is the same size as that from the eye. Let us suppose that the observer begins with the first lens—that is, the one with the longest curvature, 8.5 mm. He at once sees that the image from this is a great deal larger than that from the real cornea. He turns to 8, and still finds that, though nearer in size, it is still too large. He turns again to 7.$\frac{3}{4}$, the image from which corresponds exactly in size with that from the eye examined. He knows, therefore, that the radius of this must be 7$\frac{3}{4}$ mm., which is that of the average normal eye.

Or, supposing the observer has to deal with an eye which has a shorter curvature than usual. He finds that 7.5 gives too large an image, while that from 7. is too small. It follows that the radius must lie between the two, or 7.$\frac{1}{4}$ mm.

As with all other instruments, attention to some few points increases its efficacy. For example: in order to bring out the difference in size of the image, where the discrepancies in the length of

the radius are small, it is necessary to have an object of sufficient size, as, for example, a window; and the patient, for this reason, must sit near enough to get a large-sized image on his cornea, say not more than six or eight feet away, and his gaze should be so directed that the image of the window-frame shall fall upon the centre of his cornea. The same condition should be obtained for the artificial eye by a slight tilting movement of the hand, if necessary. It is better, also, to have the light subdued, and only from one window, and better still to have the blinds of this one closed, or the shades drawn. By subduing the light the pupil does not contract so much, and the contrast between the brighter image and the rest of the cornea is more marked.

Better, even, than the actual window for a test-object, is the reduced representation of one made as a transparency, behind which a lamp is placed. The writer uses a framework of light wood, a foot square, covered with the thin tracing-cloth used by architects and artists, and which, by the way, makes the best transparencies for all optical screens. The sides of the transparency should be about six inches deep, so as to get as even a dispersion of light by irregular reflection as possible. As there is but one source of light, there are no disturbing influences from cross-lights, and the image of the screen comes out on the cornea sharply cut and brilliantly illuminated.

In this case the patient sits not at a distance, but close to the box or screen—at about two feet from it. Care should be taken to have the reflex or image fall in the centre of the pupil, which is readily accomplished by having the patient look at the centre of the box where some slight mark can be made to serve as a guide. The wider the pupil the better; and if the observed eye is under atropine, so much the more satisfactory is the result. After a little experience it is not necessary to pay so much attention, either to the size of the object or the position of the patient, as a glance suffices. Even from a distant object, moreover, the farther the object is from the patient the less difference it makes whether the disk is exactly on the same plane as the eye, though this should always be carefully aimed at.

Two questions arise in regard to the instrument: the first is, whether differences in curvature of the cornea exist sufficiently often to make it necessary from a practical, or even interesting from a physiological point of view; the second is, whether, if such differences exist, the instrument is capable of determining them with sufficient accuracy. That the radius of the cornea differs in different

eyes, even where the sum total of the refraction is the same, I believe occurs very much more frequently than has been taught, and that future examinations will show this to be the case I have no doubt. Eyes may still be emmetropic and yet vary among each other as to the radius of their cornea, these variations being counterbalanced by other variations in the refracting power of the lens or length of axis.

The opinion that the anterior portion of all eyes is mathematically, or almost mathematically, the same, would seem to have been founded on altogether too small a number of eyes, while on the other hand the average results of different observers on eyes supposed to be emmetropic show too great discrepancies to warrant any such conclusion.

As to the accuracy of the test, it is not claimed that it is as great as that of the ophthalmometer, nor is it proposed to substitute the one for the other; still it is claimed that a difference of one-fourth of a millimetre, or less than one-hundredth of an inch, in a radius, can be detected with certainty and despatch, while it must be remembered that differences in the radius of the normal eye have occurred with different observers from 7.85 to 7.4, or nearly one-half a millimetre. No such difference as this could occur with this instrument without being at once detected. Indeed, as the writer knows from experience often repeated, a person with a good and accurate eye can tell the length of a radius within one-eighth of a millimetre, or $\frac{1}{200}$ of an inch.

Moreover, the fact that different observers have made the average radius of the normal eye so different, shows conclusively either that the radii of different eyes of the same refraction differ, or that there is a great want of accuracy in the method itself or in the work of the observer.

It may be objected that the lenses in this instrument would have to be ground with great accuracy, and this is perfectly true; but the necessary accuracy is merely a question of care on the part of the optician, as a given radius can always be obtained within one-tenth of a millimetre (or $\frac{1}{20}$ of an inch). This discrepancy, even if it existed, could be neglected. Moreover, the images formed by the series of lenses do not bear as close a proportion to each other as would at first sight appear. The proportion between 8.5 and 8 is as 17 to 16, while that between 8 and $7\frac{3}{4}$ is as 32 to 31. Even this difference, which is the smallest, can be readily told if the image be of sufficient proportions, and this can always be obtained, as described above.

As has already been said, the interval between the lenses might readily be reduced by increasing their number. This would simply increase the size of the disk. A better way, perhaps, of arriving at the same end, and giving the observer a larger selection of lenses, and therefore a nicer and more accurate admeasurement, is that of having two disks instead of one with the same interval of half a millimetre between each lens, one disk to progress on the half-millimetre, and the second disk on the quarter-millimetre. The first series then would run 8.5, 8, 7.5, 7, 6.5, 6. The second, $8\frac{1}{4}$, $7\frac{3}{4}$, $7\frac{1}{4}$, $6\frac{3}{4}$, $6\frac{1}{4}$, $5\frac{3}{4}$. Combining the two series, we have a continuous series with an interval of only one-fourth of a millimetre between the lenses. The advantage of this is, as the radii of the lenses of each disk have an interval of half a millimetre, the difference in the size of the succeeding images is very conspicuous, while by using the two disks the difference in the radius of only a quarter of a millimetre can readily be determined. For example: supposing that the observer in a given case tries 8.5. The image of this he finds too large, while that of 7.5 is as much too small. He knows, then, that the radius must be between the two, and he then tries the other series, and finds the correct radius to be $7\frac{3}{4}$. Thus, the observer has a coarse and fine adjustment, with a sufficient interval between each glass to get an image of sufficient size not to occasion any confusion.

The instrument has proved in the writer's hands not only of interest physiologically, but in some cases of practical advantage, especially in high degrees of astigmatism, simple or mixed, and in some cases of great amblyopia, evidently of congenital origin, where by its use it was at once shown that the condition of the cornea had nothing to do with the defect in vision. In some cases of refraction, too, was it of advantage, or, at least, of interest. Thus, it was assuredly of interest to see that in one of the most marked cases of hypermetropia (H.$=\frac{1}{2}$), the cornea, instead of having a longer radius than usual, had a much shorter one, it being a little more than 6 mm.

In another case of myopia of a $\frac{1}{6}$ the radius of the cornea was only 7 mm., while in another case of a myopia of $\frac{1}{2}$ the cornea had a radius of over $8\frac{1}{2}$ mm. In the most marked case of microphthalmos which the writer has ever seen, and where the diameter of the cornea was only $7\frac{1}{2}$ mm., the radius of curvature was found, contrary to all expectations, to be about that of the normal eye.

Moreover, children of any age, even infants in arms, can be readily examined, and thus an idea formed of the changes which take place in the various stages of development from infancy to old age.

The instrument ought also to be of use in solving the question in a given case, whether the myopia or hypermetropia was corneal or axial.

The instrument was not designed for the admeasurement of astigmatism, but the more pronounced degrees are easily recognizable, though it is difficult to detect the existence of less than $\frac{1}{24}$. Where a sufficient quantity exists, the reflex from the cornea of a square object, such as the screen already described, is no longer exactly a square, but a parallelogram with one dimension perceptibly larger than the other, so that if the image from the artificial eye corresponds with that from the cornea in breadth it does not in length, and, *vice versa*, if in length, then not in breadth.

Here, too, we should be able to tell, when the astigmatism is of a considerable degree, whether it was corneal or lenticular.

The comparative brilliancy of the images of the cornea and the keratometer is also a matter of interest.

In the young or adult normal eye the reflex from the cornea is more brilliant than that from the artificial eye, while in old age and in some diseased conditions the reverse holds good, and the reflex from the artificial is brighter than from the natural eye. This is the case where from any cause the epithelial layer is not as transparent and highly polished as it should be. I have even had my attention called, when experimenting with the instrument, to the existence of very faint and smoke-like opacities which had escaped my notice, and the diminished brilliancy of the image ought to show itself in any pathological condition in which the lustre of the cornea was reduced. This would occur, for example, in certain forms of keratitis, or wherever the circulation and transudation of the corneal fluids were interfered with either through increased or decreased intra-ocular pressure, as, for example, in certain forms of glaucoma on the one hand, or choroidal affections on the other.

In all cases the corneal reflex, both of the natural and artificial eye, can be magnified by a hand-glass or telescope; but this subtracts materially from the simplicity of the method, while it does not add materially to its exactness.

AN INSTRUMENT FOR THE DETECTION OF COLOR-BLINDNESS.

By DR. WILLIAM THOMSON,

PHILADELPHIA, PA.

(With Photograph.)

HAVING been invited to give advice and assistance to the management of the Pennsylvania Railroad in its examination of its employees as to sight, color-sense, and hearing, I was led to use this modification of Holmgren's method by these facts: the number of employees to be examined is thirty-five thousand, scattered over more than twenty-five hundred miles: the number of trained ophthalmic surgeons is limited and not sufficient to make these examinations in any reasonable time, collecting the facts, and deciding judicially upon them. I felt compelled to suggest some system which would enable the facts to be collected by any intelligent employees in the company's service, in such a form as to enable decisions to be justly made by scientific experts, although personally absent from the examinations.

For color-blindness I have used in this manner, for two thousand examinations, an instrument consisting of two flat sticks about two feet in length and one inch in width, fastened by a hinge at one end, and connected together by a button at the other. Between these and concealed from view, are forty white buttons, having the figures from 1 to 40 clearly engraved on them, attached to the stick by small wire hooks, which will permit of their easy removal or change of position. To the eyes of these buttons are attached forty skeins of colored wool.

In obedience to Holmgren, the test-skeins are three: 1, light green; 2, rose or purple; and 3, red. These skeins are shown to the persons examined in turns, and they are directed to select from the stick the colors which will match them.

On the stick the colors are arranged alternately to match the tests, and to be of those confusion-tints which experience shows to be most commonly selected by the color-blind. The first twenty tints are therefore green, and gray and tan-colored confusion-tints, and this part suffices for detecting any color-blindness.

A
B
C

From 21 to 30 the tints are alternately rose and blue; and from 31 to 40 the tints are red, and its confusion-colors brown or sage, etc.

When the examination is made, the instrument is closed to conceal the figures, and test-green being shown, the person examined is directed to select ten tints from the stick; and when this is done the figures are recorded by a clerk, and the selection thus made can be identified at any future time.

It is arranged, however, that the real tints commence with figure 1, and range onward by the odd figures, while the confusion-tints are designated by even figures, so that, when the entire examination is concluded—in a case of normal sight—only odd figures should appear recorded on the blank, whilst if a fault has been made by a color-blind person, it will be revealed by even numbers. In the green test the appearance on the blank of numbers beyond 20 would be more than suspicious; with the rose, anything below 21 or above 30; and with the red, any number below 31. It will be seen that any superintendent or supervising expert could thus be sure of the presence or absence of color-blindness by remembering the simple theory of the arrangement, and scanning the blank on which the numbers of the tints selected had been recorded.

The first 20 tints are green and confusion-tints, but the color-blind has the whole 40 to choose from, and does frequently select reds at the end of the series, and thus proclaim his defect. Again, of these confusion-tints, 5 are gray, and 5 shades of brown, and we may thus guess at red- or green-blindness by the first mistakes of the color-blind—those green-blind preferring grays, and the red-blind selecting the browns.

In the rose-test, between 21 and 30, the green-blind frequently select greens in the first series, and show thus their defect.

From practical experience of over 2,000 examinations by non-professional but intelligent employees, we are satisfied that all color-blind persons have been detected, since over $4\frac{2}{10}$ per cent. are clearly so defective from the examination of the separate reports. This brief description of the instrument is inadequate, but may serve to show how this subject has been rendered of practical use to the public who travel, and to the railway directors, by making the elimination of color-blind employees easy.

REMARKS.

DR. JEFFREYS could not approve of the use of the tests by the laity.

DR. THOMSON said that the colors used by him were confusing

colors, and that he had selected them after many examinations. He thought they answered the purpose very well indeed, and that even with a less number of colors we could eliminate the four per cent. of color-blind employees.

THE PRESIDENT remarked that it would evidently not fall to the Society to recommend any particular methods, but it could express its opinion upon the subject. Resolutions relative to this would be received and acted upon. It would be desirable that those interested in this matter should communicate their views in some form to the corporations.

A MODIFICATION OF LORING'S OPHTHALMOSCOPE.

BY DR. HENRY D. NOYES,
NEW YORK.

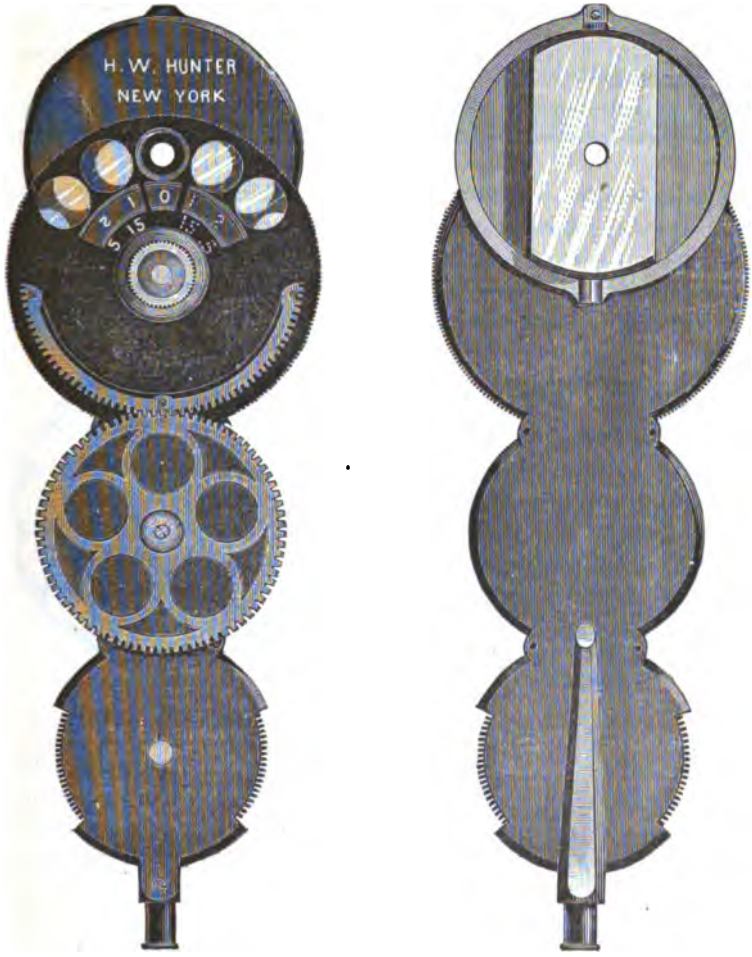
THE instrument figured on opposite page has only this claim to existence, that it furnishes a means of bringing before the eye a large series of glasses in rapid and uninterrupted succession, in a manner which the writer has found more convenient than any other. The contrivance for this purpose is a cog-wheel system, and this has been employed by Dr. Loring, although not in this manner, and such instruments have not been on sale.

In developing this feature it has been found that two wheels geared together would serve the best purpose for the rotation of the front or primary disk, while a single wheel is employed for the back or secondary disk. The effect is, that for the front disk the acting wheel, viz., the bottom one, is moved in the same direction as the movement of the disk. For the back disk the acting wheel causes a reverse motion.[1]

To prevent the beard of the observer or patient, if either be so adorned, from being caught by the wheels, the upper one of the pair is perfectly covered up, and the lower one is exposed for a part only of each side. The single wheel is open and has not been found to

[1] In accordance with a suggestion of Dr. Prout, of Brooklyn, the position of the convex and concave glasses on the back disk is made the reverse of the arrangement on the front disk, and the effect is that in turning it the finger may act in the same direction as for the front disk. In the front disk the convex glasses are on the left side, on the back disk they are on the right side.

give any annoyance. To balance the instrument a long and unusually thick handle has been adopted. The optical features are those of Loring's last model, including the tilting mirror, which is also set



in a ring that permits it to be rotated to various positions, as was done in the original invention of Helmholtz.

There can, therefore, be little claim to novelty in the instrument; yet, inasmuch as Dr. Loring never saw fit to advocate the suitableness of employing cog-wheels, the writer has been led to experiment

with them. The instrument, as presented, has been in use for months, and has fulfilled all that can be desired.

Its mechanical facility has given added worth to the admirable optical contrivances of Dr. Loring's instrument, and an ophthalmoscopic examination is by its aid performed with quickness, thorough-

ness, and comfort. One point may be adduced as worth observation. By using the secondary disk with +15 D. one may scrutinize the front of the eye, including the lens and anterior part of the vitreous, and then either turn on the series of concave lenses of the primary disk to explore the deeper parts of the vitreous, or, turning

off the secondary disk, be placed at once in view of the fundus, providing the eye be approximately emmetropic. To gain the better command of the instrument by the cog-wheel system has seemed, by the writer's experience, to fully justify the additional appliances. The parts are figured of exact size, and the weight is 80 grammes.

AN IMPROVEMENT IN CONCAVE SPECTACLE-GLASSES OF HIGH POWER.

BY DR. JOHN GREEN,

ST. LOUIS, MO.

CONCAVE glasses in the higher powers are clumsy and heavy, in consequence of their great thickness in their peripheral portions; yet the periphery of the glass is practically never used.

By making the principal refracting surface small, say two centimetres in diameter, and grinding it upon one side only—that turned toward the eye—of a double-convex, double-concave, plano-convex, plano-concave, or plane glass, a single grinding-tool may be made to yield lenses of any desired focus, within a range of say eight dioptrics and with intervals not exceeding $\frac{1}{4}$ d., or even $\frac{1}{8}$ d.

Glasses ground in this manner are very light, and they are all, in some degree, periscopic; those ground upon convex lenses are true menisci.

The accompanying figure shows sections of three such glasses, ground with a tool of −20. d. (about one Paris inch radius) upon a double-convex, plane, and plano-convex lens respectively. The double-convex lens is of the value of 8. d. (radii of about five Paris inches); the value of its anterior surface is therefore equal to +4. d., and the value of the lens is equal to +4. d. − 20. d. = − 16. d. In the plano-concave lens the value of the combination is, similarly, − 4. d. — 20. d. = − 24. d.

By thus combining the single concave surface, −20. d., with the anterior surface of any double-convex or double-concave lens between the limits + 8. d. and −8. d., or of any plano-concave lens between the limits 0 and −4. d., we can easily command a series ranging from −24. d. to −16. d., with a common interval of .5 d.,

or even .25 d. Similarly, a concave surface of —16. d. (about 1¼ Paris inch radius) will yield a series ranging from —20. d. to —12. d., with the same common interval of .5 d. or .25 d.

I have to exhibit two pairs of spectacles, made after my instructions by Mr. A. P. Ecker, optician, of St. Louis. The concave surface of —16. d. is ground in the one case upon one side of a double-convex lens of +8. d., giving a combination equal to +4. d. —16. d. = —12. d., and in the other case, upon a plano-concave lens of 1.5 d. giving a combination equal to— 1.5 d. —16. d. = —17.5 d. In the second pair of spectacles the edges of the glasses are grooved, and the weight does not exceed that of a pair of ordinary spectacles of —1.5 d.

AN ACUTE GLAUCOMATOUS INVASION, FOLLOWING CLOSELY UPON A SINGLE APPLICATION OF A VERY WEAK PREPARATION OF DUBOISIA.

BY DR. JOHN GREEN,

ST. LOUIS, MO.

CASES of acute attacks of glaucoma, seemingly induced by the use of atropia, are sufficiently common. A similar attack has recently followed, in my hands, upon a single application of duboisia.

Mrs. B., widow, aged sixty-seven, lost her right eye six years ago from acute glaucoma, which was for a time mistaken and treated for neuralgia. The eye has remained free from pain since recovery from the acute attack, and is now soft, with a dilated pupil, a shallow anterior chamber, and an opaque lens.

June 7, 1880.—She called on me with the statement that vision had been failing for more than a year, but that she had had no pain. Examination showed Hm. $\frac{1}{16}$; V. $\frac{18}{60}$; pupil not at all dilated; anterior chamber shallow; T. +?

June 11th.—I ventured to dilate the pupil by means of a small bit of paper impregnated with duboisia extract, using a piece of such size as I have found ordinarily to produce a medium grade of mydriasis in from thirty to forty minutes.

The ophthalmoscope showed a shallow depression of the outer

half of the optic disk, with the *lamina cribrosa* plainly visible through the transparent floor of the excavation. Elsewhere the disk was somewhat swollen; the retinal veins were full, and there were a few hemorrhagic streaks in the retina radiating from the disk.

Two hours after the examination pain came on, and continued "off and on" during the night. It was very severe at times, and was attended with nausea and vomiting. I was not informed of the attack until the next day, at which time the eye presented the usual appearances of acute glaucoma: globe very hard; pupil widely dilated; anterior chamber very shallow; media clouded; vision reduced to the ability to see the hand at one foot distance, but not to count the fingers.

A vigorous course of myotic applications was commenced—Calabar extract alternating with pilocarpin muriate—under which the pain, mydriasis, and cloudiness of the media rapidly diminished, and vision promptly improved. On June 18th the eye had nearly recovered its appearance as it was before the recent attack: Hm. $\frac{1}{20}$; V. $\frac{18}{60}$. The pupil was a little elongated horizontally, and the anterior chamber was perhaps a little shallower than before the attack.

Under the continued use of pilocarpin muriate ($\frac{1}{60}$), dropped into the eye from four to six times a day, the eye continued to improve up to the day of the last record, July 13th, at which time I found Hm. $\frac{1}{16}$, V. $\frac{18}{60}$, tension+?, anterior chamber not appreciably shallower than when first seen five weeks before; the pupil was still a little elongated horizontally, and it was not possible to produce full myosis by the use of Calabar extract.

NOTE.—October 20, 1880.—After July 13th there was observed a gradual falling off in the acuteness of vision, which remained at $\frac{18}{100}$ from August 2d to September 4th. September 15th it had fallen to $\frac{18}{200}$.

September 28th the eye showed signs of a new attack of acute glaucoma—increased tension, severe pain, and shallowing of the anterior chamber. Iridectomy was performed September 30th.

October 10th I obtained a fairly good view of the fundus, in conjunction with Dr. A. Alt, who was visiting St. Louis. The whole disk appeared gray and opaque, with very little appearance of excavation; the hemorrhagic streaks in the retina had wholly disappeared, and a rather large fixed opacity was seen in the vitreous above and anteriorly. Since that date the tension has increased and no further view of the fundus has been obtained.

REMARKS.

DR. E. WILLIAMS had had one case in which there was a previous history of glaucoma and loss of the other eye, and in which there

was a history of hemorrhagic retinitis. We all knew how liable glaucoma was to develop under such circumstances. The mere fact that glaucoma came on so soon after the use of duboisia, especially with so weak a solution, he did not think was sufficient evidence for its being considered as having anything to do with the causation of glaucoma.

DR. KNAPP thought that mydriatics should always be avoided when there was any predisposition to glaucoma; he thought it was safe to adopt this rule. The cases were too numerous where glaucoma had occurred soon after the use of mydriatics.

DR. GREEN remarked that it was this fact which caused him to use a weak preparation of duboisia. He believed that the attack was directly provoked by the application.

DR. E. WILLIAMS remarked that he was glad that a rule had been given in reference to the use of mydriatics. But just a few days before he left home he had under treatment a patient, a young man, in whom a small ulceration of the cornea occurred about midway between the centre and periphery, resulting in complete perforation without prolapsus. When he became convinced of the existence of perforation he resorted to the use of eserine, and kept the pupil contracted. The aqueous humor escaped, and the ball was moderately soft. The wound did not close. He made one instillation of a four-grain solution of atropine, and the pupil was dilated, the aqueous being retained.

DR. WADSWORTH had for a long time been of the opinion of Dr. Williams in regard to the causation of glaucoma. He had regarded its occurrence as co-existent with the use of certain remedies rather than caused by them. Recently he had had a case which it was perhaps proper to call hemorrhagic glaucoma, in which the disease had certainly not seemed to be increased by the use of atropine. The patient, a lady near seventy, when first seen had numerous hemorrhages of the retina; there was no pain, no increased tension. Two months later, severe pains suddenly came on. When seen two days afterward, there was increased tension, and so much turbidity of the media that no reflex could be got from the pupil. He gave atropine and the pain diminished for a few days, but returned while the patient was still using atropine, and the eye was enucleated. A case under his care some years ago was of interest in this regard. A woman came to the hospital complaining of pain in and about one eye. There was circumcorneal congestion, and one or two narrow posterior synechiæ. Atropine was applied. Half an hour later the pain was relieved, and an ophthalmoscopic examination revealed strong arterial and venous pulsation and large central excavation. T. was increased. On inquiry into the history it was learned there had been short glaucomatous attacks during the past five months, of late at intervals of less than two weeks. In accordance with the prevailing opinion, the patient was now warned against the use of atropine; but on a subsequent attack, ten days later, she did use atropine herself, and again with relief of pain. An iridectomy stopped

the attacks, at least during four months that the case was under observation. In this case, it is true, there were one or two synechiæ, but the attacks she had had were all sudden and of short duration, with nothing to point to a previous iritis as the origin of the synechiæ.

DR. RISLEY remarked that he had already put upon record a case of posterior synechia where atropine aggravated the pain, but duboisia relieved it at once. Duboisia quieted the pain in two subsequent attacks.

AN IMPROVED OPERATION FOR A NEW PUPIL AFTER CATARACT OPERATIONS.

BY DR. EDWARD G. LORING,

NEW YORK.

WHEN, after an operation for cataract, the pupillary space becomes closed through inflammatory processes, it becomes necessary to open this by what is known as a secondary operation, but which is often, if not usually, a more serious undertaking than the original operation; how serious, indeed, is shown by the repeated operations which become necessary in order to establish an opening and to counterbalance the ever-recurring and almost irresistible tendency to a subsequent closure—operations which, from their very frequency and inherent violence, often lead to a total loss of the eye.

The means by which these openings through the denser membranes are usually made consist either in a simple iridectomy, or in this combined with the section of the iris *in situ* by means of scissors, as, for example, those of Wecker. But both of these methods are open to grave objections, which are only too apt to defeat the object of the surgeon, and to cause the operation to fail even where success seemed to be most apparent. For, even with a simple iridectomy, a large external wound must be made in order to give sufficient play to the arms of the forceps, as one of the chief, if not the chief, reason why a failure to grasp the iris takes place is because the opening-wound is too small. This necessity of making the external wound of sufficient size is, however, in itself a source of great danger, no matter how smoothly the operation may have passed off, for the inflammatory reaction which accompanies the closure of the wound is apt to propagate itself to the iris, already the subject of inflammatory

processes, and a new attack is lighted up, to be followed by even a firmer closure of the pupil than before. Thus, the apprehensions arising from the external wound alone are neither light nor to be disregarded; but, when to these are added the difficulties in seizing the iris, the tension required to draw this through the wound, the great danger of rupturing the hyaloid, the loss of vitreous, and the occurrence of the deeper-seated and oftentimes violent hemorrhages, we have one of the most difficult and harassing positions in which the ophthalmic surgeon can be placed.

Nor is this all, for it often happens that this secondary operation for iridectomy passes off with perfect success. A large piece of the iris is excised, and the pupillary space presents a uniform and promising blackness. Moreover, the convalescence is perfect and unretarded, while the eye, when the bandages are removed, presents a very favorable aspect; but, unfortunately, to the grief of the patient and the surprise and mortification of the surgeon, vision is no better than before the operation, and a thorough examination now reveals the fact that the iris has come away, leaving behind it a thickened and deep-seated membrane covered with uveal pigment, which, surgically speaking, is harder to deal with than before the iris was removed.

Nothing remains to be done under these circumstances but a needling operation, which, from the widely extending ramifications of the membrane, and its connections with the ciliary body and hyaloid membrane, is both difficult and dangerous. It is to avoid these numerous and, as a usual thing, inefficient operations, that it has been proposed to attack these membranes from the beginning with scissors, with the hope of excising a piece of sufficient size to insure a permanent opening. This proceeding, to which are added, besides the dangers of simple iridectomy, the almost unavoidable loss of a large quantity of vitreous, is so grave in its nature, and so disastrous in its results, as to be, in the writer's opinion, seldom or never justifiable, especially as a much simpler and more efficacious method can be adopted.

This consists, in the writer's opinion, in the transverse division of the iris and all underlying membranes—a modification, in fact, of the operation of iridotomy. This operation is at the present time but seldom performed, as the cases to which it is adapted are supposed to be of rare occurrence, and from the fact that even in these cases it rarely results in success. This want of success, however, is due, I think, not so much to the kind of operation as to the manner in

which it is performed. For the knife is entered commonly somewhere in the arch of the clear cornea, nearly perpendicular to the plane of the iris, and consequently at a small angle with the position of the opening to be made in its surface. From this it results that either the edge of the pupil is simply depressed before the knife, or, if a perforation is made, it is very small, and, from its position in the centre of a tense but inelastic membrane, is apt to close again almost immediately after the operation.

The substitute for this operation which I now propose consists, not in a simple opening in the centre of the iris, but in a large, free, and transverse section of the iris and all underlying membranes. The method of arriving at this result is as follows: any narrow knife, such as the ordinary cataract-knife of Graefe, may be used, though the narrow blade suggested by Liebreich is preferable. Better than either, however, I think, is the knife which I have had constructed for this purpose, and which is represented in the adjoining figure. This is simply an extremely narrow knife, with a very delicate cutting edge. The reason why the knife is made so narrow is that it may be turned on itself in the wound, at right angles, if necessary, with the position it occupied in making the puncture.

During the last year or two I have experimented with knives of various kinds and shapes, especially with those in which the blade is comparatively short, that is, from five to eight millimetres in length, with a delicate round shank; but I have a decided preference, in this method of operating, for the one described and figured here, which has a long and continuous cutting edge, for the others are apt to pierce the membranes without cutting them, when these are dense and tough, as is the rule in the cases under consideration.

The eye is fixed in the ordinary method, opposite to the site of puncture. The knife is then entered, not in the clear cornea, but at the sclero-corneal junction, or just within the scleral ring, and at the middle and outer circumference, if the cut is to be horizontal; at the lower border, if vertical—as it usually is.

Still, in desperate cases, the horizontal section of the iris has given, in the author's hands, the best results. The puncture is, indeed, made precisely as in the operation for cataract. If the anterior chamber is deep enough, and a narrow knife is used, this is entered with the edge downward, the blade of the knife being perpendicular to the plane of the iris. The knife is then carried completely across the anterior chamber, precisely as if a counter-puncture were to be made, until the point arrives at the peripheral portion of the major circle of the iris. The section is then performed by suddenly depressing the point of the knife with a bold, free movement of the hand, until the handle of the knife, from being horizontal, assumes a vertical position. Nor should the operator be content with this movement alone, but supplement it, while the point of the knife is still deep in the vitreous, with a gentle sawing movement while the knife is being withdrawn. In this way the fibres of the iris are thoroughly divided through its entire diameter, even up to the ligamentum pectinatum, and upon this fact, I think, the success of the operation depends; for we know that in that rare accident, rupture of the iris from violence, the resulting opening is not a linear split, but a wide extending aperture, which has precisely the appearance as if a large and complete iridectomy had been performed, although the eyeball itself has remained intact. Moreover, the autopsy shows in these cases of rupture that the cleft extends back as far as the ciliary processes themselves, and I am of opinion that something of the same kind takes place, through the elasticity of the tissue, when the incision is made to extend to the extreme peripheral portions of the iris. Of course, the cut must not be carried so far as to involve the ciliary processes and the ciliary muscle, though little injury, I am inclined to think from my own experience, would follow even if these were invaded to a small degree.

If a very narrow knife is not used, but the ordinary Graefe knife employed instead, or the anterior chamber is very shallow, then the knife is entered as in the ordinary operation for cataract, with the flat side parallel with the iris. It is then rotated when the point arrives at its proper destination, until the cutting edge is presented fairly to the membrane. The turning of the knife wrinkles up the cornea to a certain degree, but, notwithstanding this, the rotation should be thoroughly performed. For, if the attempt is made to depress the knife on the flat, or at an angle, the resistance offered by the thickened iris may suffice to tear this latter from its attachments, or, a small rent in its surface having been made, the rest of the iris

may be so folded back behind the knife as to give the impression that an opening of considerable extent has been effected, but which closes up again almost immediately by the depressed portion of the iris returning to its former position, and becoming fused a second time with the surrounding tissue.

As a first result of the operation, the surgeon usually finds the tissue give way before his knife, to be followed by a rent of a jet-black appearance. Should this not occur, he may feel pretty sure that the operation is not going to be successful, which is probably due to the fact that his incision has not been bold and free enough, or carried sufficiently toward the periphery at the finish.

In rare cases the new pupil may remain open and maintain its dark appearance from the beginning, and vision be at once and permanently improved. This can only occur, however, when the bleeding is slight. As a rule, the hemorrhage is sufficient to fill the pupillary space and so reduce the amount of vision that the operator may doubt whether any benefit has been obtained, especially as these clots are absorbed but very slowly. I have known the vision to remain unimproved for the space of two weeks, and then a gradual increase of sight to take place, followed by an admirable result. Sooner or later, a marked improvement almost invariably takes place, provided the sensation of splitting of the tissue under the knife is followed by the appearance of a black pupillary space. In those very pronounced cases where the membranes have such a density and such firm connections that there is fear of tearing the iris away from its attachments or seriously rupturing the hyaloid membrane, it is sometimes of advantage to use a second instrument to support the iris, and thus counteract the traction which the knife exerts in making the incision. A simple stop-needle can be used for this purpose, and this is then passed vertically through the peripheral portion of the cornea, transfixing the iris and subjacent tissues as it passes into the vitreous.

The needle is held vertically with one hand, while the cut is made with the other. It also serves, when skilfully managed, for the fixation of the eye. As these needles have, however, no angle, it is a little difficult to hold them in such a position that the iris does not descend along their polished surface with the pressure exerted by the knife when the cut is being made. It was to avoid this difficulty that the hook represented in the figure was designed. It is, in fact, a stop-needle with a curve to it. The hook is passed through the periphery of the cornea, and also through the iris and underlying

membranes. The handle is then gently raised until the iris rests in the bight or angle of the hook. The hook is, of course, inserted first, but it is better not to raise the handle until the knife has been carried across the chamber, and is in a position to make the section.

What has been said hitherto has applied to those desperate cases in which the inflammation has been so violent as to have invaded the whole iris, and the inflammatory products are so great that it is not so much a question as to what kind of an opening shall be made and of what shape, as it is to get an artificial pupil at all. But there are cases in which the inflammation seems to have spared the greater part of the iris, but to have blocked up the coloboma occasioned by the iridectomy, with a membrane too firm, both in its construction and in its connections, to be torn with needles or to be removed by traction. In these and similar cases, it would seem to be wiser to leave the membrane *in situ*, and to split the iris from the sphincter downward. The knife is then entered from below and carried upward beyond the pupillary margin, and the same depressing movement is made as has already been described, care being taken here likewise to divide the peripheral fibres of the iris by a gentle sawing movement as the knife is withdrawn.

The great advantage in this method of operating is the little violence done to the eye, since, in the first place, the external wound is so small that, as a rule, no vitreous whatever escapes, while the wound, from its very minuteness, closes at once, sometimes so quickly that the aqueous humor is reformed while the patient is still on the bed. Moreover, in the vast majority of cases the operation is so rapid and so painless that it can be performed without an anæsthetic, and can thus be repeated, when occasion requires, with but little discomfort to the patient, and little or no danger of inflammatory reaction. This method is very often of advantage, too, as a preliminary operation in those cases where an iridectomy would seem to be ultimately indicated, for by its means one portion of the iris can either be cut across or freed from its attachments to the surrounding tissue, so that, when the iridectomy is subsequently performed, the iris, having one free edge, can be seized by the forceps or a blunt hook, and drawn through the wound.

Here, as in every other case where the pupil has become occluded, it is better to wait a sufficient time for the inflammatory products to have become thoroughly digested before the operation is attempted, and the most brilliant results have followed when several months have been allowed to elapse between the extraction and the second-

ary operation. Still, in those cases where an inflammatory action of a low degree has followed immediately upon the original extraction, and the eye is prone to fall into a phthisical condition, it is often of great benefit as a curative means to perform the operation at once. Particularly is this the case in capsulitis, which I am inclined to think is not recognized, especially in its early stages and in its lighter degrees, so frequently as its importance demands. The trouble usually begins with an infiltrated and thickened appearance of the posterior capsule, which is often supposed to be due to remains of the cortical substance of the lens. The iris at this time is but little implicated, and is still dilatable to a considerable degree under atropine, and may continue so even when the proliferation of cells is so great as to produce a yellow appearance within the cavity of the capsule, or a hypopyon in the lower part of the anterior chamber. Little by little the iris becomes invaded by transplantation of the inflammatory process; the interchange of fluids between the anterior and posterior chambers is interfered with, the aqueous humor becomes turbid and the eye soft; the vision sinks very much, even to mere perception of light, and the whole eye seems to be gradually melting away under a low stage of inflammation.

If now an iridectomy is performed, the same dangers arise from the wound, and the same difficulties are experienced in getting out a piece of the iris, that have already been mentioned. But if, even in the later stages of the trouble, a simple but bold and free transverse division of the infiltrated capsule and the iris, or at least its sphincter, be made, the effect is always salutary and oftentimes magical.

I am therefore convinced, from my own experience, that this method of operation is one of the least dangerous and most efficient and speedy ways of making a permanent opening in just that class of cases which, as a usual thing, offer the greatest embarrassments to the surgeon.

A MODIFIED OPERATION FOR DISCISSION IN SOFT CATARACT.

BY DR. JOHN GREEN,

ST. LOUIS, MO.

THE ordinary sickle-needle kystotome has proved in my hands an especially convenient, safe, and efficient instrument for executing a horizontal linear cut in the anterior lens-capsule. By its use the lens-substance may also be more or less extensively broken up, as the operator may desire, while the risk of rupturing the suspensory ligament, or of dislocating the lens, is reduced to a minimum.

The needles which I have used are of the manufacture of Lüer, of Paris, and of Otto & Reynders, of New York, the former having been made about thirty-five years ago, the latter about five years. Both are of a thin and delicate model, and in both the shank of the needle fills the hole made by the cutting portion. Both needles penetrate the cornea about as easily as the ordinary cataract-needles.

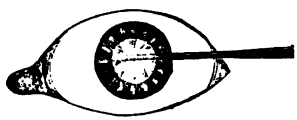


FIG. 1.

The puncture of the cornea is made near the outer (temporal) end of its horizontal meridian, holding the needle so that its flat side is parallel to the plane of the pupil, traversing the anterior chamber in the same position, and turning the point backward toward the lens only after it has reached nearly or quite to the opposite (nasal) side of the previously dilated pupil. (See Fig. 1.)

The division of the capsule, or of the capsule together with some of the layers of the lens, is effected by pressing lightly upon the lens-capsule with the point of the needle, and so withdrawing it. The linear cut in the capsule opens out into an oval, as indicated in Fig. 2.

FIG. 2.

By this method of operating, the length of the capsular opening, and also its position—whether across the centre of the pupil, or above or below the centre—can be very accurately regulated. The division may be confined to the lens-capsule and the most superficial layers of the lens, or it may be made to extend deeply into and

thoroughly to break up the lens-substance. The operation is therefore equally well adapted to simple capsular discission for solution, and to the freer division of the lens preliminary to linear extraction or suction.

NOTE.—The sickle-needle is mentioned and figured by Arlt—Graefe-Saemisch, III.—as a form of needle which may be used for the operation of discission, but the manner of using it is quite different from that which I have advocated.

REMARKS.

DR. KNAPP remarked that the needle referred to was very old. He had formerly used it in the operation of extraction, but had not found it as sharp as he would like. For capsulotomy in extraction he now used such a knife somewhat modified, making the cutting part straight.

DR. NOYES remarked that the needle referred to was familiar to all, the difference in quality depending, he thought, upon the thickness of the blade.

DR. GREEN remarked that both of his needles were of delicate construction and satisfactorily sharp at the point.

DR. WEBSTER said that the opening in the capsule, as indicated by Dr. Green, was much more extensive than that which he had been accustomed to make, and inquired if so free a division was not followed by a high degree of swelling of the lens.

DR. GREEN replied that he could make a small opening by this method as easily as a large one, and that a small opening was often to be preferred. If a large opening is required, this method offers the best means of making it, and with the least possible injury to the eye; but in making a free discission we must, of course, bear in mind the probability that we may have to get rid of the softened and swollen lens by linear extraction or by aspiration.

DR. BULLER inquired if he had found in certain instances any difficulty in dividing the capsule with the instrument which he recommended.

DR. GREEN replied that he could only speak of the two needles which he had used; with these he had had no difficulty. It was an instrument well known to the instrument-makers, and, he believed, generally well made by them. If he were to suggest any modification of it, it would be to sharpen the convex back of the needle for about a millimetre from the point, and thus possibly improve its penetrating power in passing through the cornea.

CASE OF NUCLEUS-LIKE BODIES IN THE LENSES OF A CHILD, ESCAPING AFTER DISCISSION.

BY DR. JOHN GREEN,

ST. LOUIS, MO.

A GIRL, ten years old, and of average physical and mental development, came under treatment in October, 1879, with well-developed cortical cataract of nearly simultaneous appearance in both eyes. Until within a year she had been supposed to have ordinarily good vision.

Discission was performed upon the right eye, with the sickle-needle kystotome, in the manner described in the last paper. A central horizontal incision was made in the lens-capsule, across the field of the previously dilated pupil, through which a body, in appearance like a nucleus, and somewhat exceeding three millimetres in apparent diameter, escaped into the anterior chamber. The cortical portion of the lens was quite soft, and disappeared by solution in the course of two weeks, the nucleus having, meanwhile, become only slightly notched at its periphery. Nearly two months, dating from the operation, were required for its complete solution.

Two weeks after the operation on the right eye discission was performed upon the left eye in precisely the same manner, and was followed by the escape of a precisely similar nucleus. Six weeks after this second operation the patient went home with clear pupils and with only a very small remnant of undissolved nucleus in the left eye.

I have not before seen anything resembling a nucleus in the lens of a child, and I am inclined to the belief that the nuclear bodies observed in this case may have originated in lamellar cataracts, which may have been overlooked by the not very intelligent parents.

NOTE.—October 15, 1880. Four days ago, in operating by this method upon the right eye of a child three years old, with congenital cataract of both eyes, I encountered a precisely similar central body, which was not dislocated from its position. The rest of the lens, which was quite fluid, has already disappeared by solution, leaving the central solid body *in situ*, where it presents the general appearance of a lamellar cataract surrounded by a zone of clear lens.

OPTICO-CILIARY NEUROTOMY.

DR. HENRY W. WILLIAMS, of Boston, gave a brief account of his experience with the new operation for enervation of the eyeball—optico-ciliary neurotomy. He prefers operating from the inner side, with division of the internal rectus, which may afterward be re-attached to the globe by means of a point of suture. The use of Warlomont's scissors, which crush the retinal and ciliary vessels in dividing them, prevents or lessens the copious hemorrhage, which may cause marked temporary exophthalmos, and thus give rise to pain from distention of the lids and the intra-orbital contents. Should this happen, it soon disappears under the use of cold compresses, as does also the ecchymosis of the lids which generally follows the operation.

Sufficient time has not yet elapsed to allow us to determine the absolute value of neurotomy as a substitute for enucleation. In fact, Dr. Williams had twice done enucleation, perhaps unnecessarily, subsequently to having made the section of the optic and ciliary nerves, because of the persistence of symptoms which made him unwilling to take the responsibility of relying on a procedure of which the efficacy had not yet been fully established. But in most of his cases the results had thus far proved as satisfactory as those of enucleation. In two instances where bits of steel had remained in the eye—in one case fifteen, the other two years—the neurotomy gave immediate relief to urgent sympathetic symptoms, and the patients remain now, ten and six months after the operation, free from all morbid indications, notwithstanding the continued presence of the foreign bodies within the globes.

Dr. Williams considers a reunion of the severed ciliary nerves as exceedingly improbable, because of the tortuousness of their course through the loose tissues at the bottom of the orbit, and of the considerable projection forward of the eye which occurs in the first days after the operation. If, however, it should be proved that such a reunion does sometimes occur, and that it may give rise to a renewed manifestation of threatening symptoms, the comparatively slight operation of enervation might be repeated in any instance where there

seemed to be cause to suspect that reunion had formed, or that any important branch had escaped section.

REMARKS.

THE PRESIDENT remarked that the subject was one that interested him a great deal, and he hoped that Dr. Williams would give full histories of his cases in his completed paper. He would simply state a single case. During last winter a patient had submitted to two or three operations upon the eye. Sympathetic trouble having developed, the question was whether to enucleate the eye or perform the operation of ciliary neurotomy. He had found no difficulty in dividing the nerve. All that was required was to drag the eyeball downward and outward to an extreme degree, and then cut through the tissues. There was no difficulty encountered in operating upon this case. The subsequent result of the operation was convergent strabismus. Still later, however, the globe acquired its normal position. There was a question whether we might not give rise to sympathetic trouble from resting the artificial eye upon the stump.

DR. WADSWORTH said he had done the operation in eight cases. In all there had been relief of pain from the first, but in one pain recurred two months after the operation, with tenderness to pressure in the outer ciliary region; the eye was enucleated. The original affection in this case was rheumatic; the patient suffered from general rheumatism, and it was quite possible that the recurrence of pain was due to a rheumatic affection of the scleral or episcleral tissues, rather than to regeneration or escape from section of ciliary nerves. The recurrent pain was not constant—was confined to the eye itself; the cornea remained anæsthetic. In this case, as in all his cases, the internal rectus had been divided, and, after section of the opticus, the eye rolled so as to bring the posterior portion of the sclera to the front. His first case, and the first one in Boston, was operated on early in November, 1878. From both eyes cataracts had been removed a number of years before. One eye had been blind several years; lately it had become painful, and there was sympathetic irritation of the other. Neurotomy relieved the symptoms entirely. The cornea remained clear for several months, but since had become in part cloudy, grayish. In another case, operated on eighteen months before, the cornea was still anæsthetic, but perfectly clear, although the patient was a laborer, exposed to all weathers.

DR. NOYES stated that he had an old treatise which gave many anomalous distributions of the ciliary nerves, and he thought it exceedingly probable that there might have been some undivided twigs that kept up the sympathetic irritation.

DR. H. W. WILLIAMS considered that the indications for the new operation were much more extended than those for enucleation ever were. We still had the operation of enucleation in reserve. We saw many cases where we felt that the patient ought not to go from under our observation, but in which enucleation would not be

recommended at the time, or be consented to by the patient. In such instances enervation could be used as a preventive of sympathetic ophthalmia, and the patient would, in a large number of cases, consent to it. Admitting that we would occasionally lose an eye after this operation, he thought its employment would greatly reduce the number of cases in which sympathetic inflammation occurred.

DR. NOYES remarked that in his case there was no hemorrhage at the time of the operation, though in the majority of cases there was a rush of blood. The relief of pain which usually followed the operation seemed to him important evidence as to its value.

DR. NORRIS said that he had an exceptional case to report. The case was one of hemorrhagic glaucoma for which iridectomy had been done, with the result that the wound healed and the eye remained quiet for some time. There were further hemorrhages into the eye subsequently, and severe pain; however, the eye still looked well. Enervation of the eye was performed. Some difficulty was experienced in consequence of the excessive hemorrhage. The nerve was divided about one-eighth of an inch back of the eyeball, the ball was turned forward, and all the ciliary nerves divided. During this time there was a great deal of hemorrhage into the orbit, so that when he attempted to return the ball into its place he found he could only hold it in position by exerting considerable force; hence, he was obliged to complete the operation by enucleation. As before remarked, the patient had a tendency to hemorrhage in the retinal arteries.

CASE OF BUPHTHALMUS, WITH CENTRAL ANTERIOR SYNECHIA, CURED BY TOTAL REMOVAL OF THE IRIS.

By DR. HENRY D. NOYES,

NEW YORK.

THE subjoined case is, so far as I know, unique in the practice of eye surgery, and illustrates forcibly the theory of distention of the eyeball as the result of occlusion of the angle of the anterior chamber, and affords testimony to the curative value of an operation by which this occlusion is removed.

John Fitzpatrick, aged seven years, was admitted to the New York Eye and Ear Infirmary, November 19, 1879. The left eye was injured several years before, having been punctured by a pair of scissors. The anterior half of the globe is much enlarged, including the whole ciliary region and the cornea. The ciliary region is stretched to a bluish zone and the cornea projects in a globular form, having a diameter of not less than 18 mm., although it was not measured. It is thin and bluish black, and pervaded by a thin opacity, while a dense yellowish spot at the middle indicates the wound. The anterior chamber is apparently very deep and black, but in reality is abolished. The iris is pressed against the inner surface of the cornea over its whole surface and adherent to its middle, where the wound was made; its origin from the ciliary body can hardly be distinguished. The pupil is totally adherent to the cornea.

Tension + 1; eye not painful; lids could be closed over the globe; opposite eye good. Relief from deformity was what the parents desired, and the problem was how to reduce the eye to a normal size. Enucleation was to be the alternative if reduction could not be effected. I determined, in view of the peculiar relations of the iris, to try what would result from its total removal, provided this could be accomplished. An iridectomy I knew would be impracticable and inefficacious. Partial removal of the globe, by Critchett's method, I was unwilling to perform, because suppuration is not infrequent.

Chloroform given, an incision about 4 mm. long was made by the

point of a Graefe's knife thrust at a tangent into the vicinity of the origin of the iris. An effort was made to get across the anterior chamber with iris-forceps, but it failed. A small, sharp hook was then pressed between the iris and cornea flatwise and pushed across until the iris on the far side of the chamber, near its periphery, could be entangled in its point. It was rotated upon itself so as to secure a good bite of the iris, because the tissue, being atrophied, was very weak, and traction was steadily made to loosen the peripheral margin. It yielded easily and gradually tore away until about one-half was detached. The hook, with the iris-tissue in its grasp, was now outside of the wound, and the remaining iris was withdrawn with forceps, by means of which the attachment to the corneal scar was torn off. Very moderate bleeding occurred. A bandage was applied to both eyes.

On the fourteenth day the eye was healed, irritation almost disappeared, the staphyloma much reduced. Patient went home. In February, 1880, between two and three months after, the globe was found rather less than normal size, although not soft. The cornea had contracted and flattened, it had acquired a dense white opacity, with evident increase in thickness; the ciliary region was of normal appearance, the globe not tender.

There could be no question of the success of the operation in restoring the eye to its proper dimensions, and this was effected without any suppuration, but apparently by simply restoring the channels of excretion to their normal permeability. I am aware that Mr. Bader has done the same operation for glaucoma absolutum, and in 1872 he strongly recommended it. I repeated the proceeding in one case, but with disastrous results. No difficulty attended the operation, but during the night the lens was unable to sustain the *vis a tergo*, and was pushed out of the eye through the wound. Panophthalmitis and phthisis ensued. In the boy with buphthalmus it is probable the lens had disappeared; the tension was only +1, and such a mishap as I relate in my case of glaucoma absolutum could not occur. But I could not promise myself that unpleasant bleeding might not happen, and the curative effect of the proceeding was simply a speculation. Its success bears forcibly in sustaining the views of Knies, Weber, Schnabel, Brailey, and Priestly Smith, as to the importance to be attached to occlusion of the canal of Schlemm and the parts adjacent in giving rise to increased tension; and the gradual recession of the globe is direct evidence in favor of the theory that iridectomy in some measure effects its cure by opening up the obstructed channels of efflux of the intra-ocular fluids.

DERMOID CYST OF THE LEFT CORNEA.

By DR. S. D. RISLEY,
PHILADELPHIA, PA.

A. R., aged eighteen years, male, consulted me January 20, 1880, regarding a tumor on his left eye. He related that his mother had noticed during very early infancy a white spot the size of a large pin's head near the external limbus of the cornea, but situated entirely on the sclerotica. It gradually increased in size as the child grew. It has never caused any pain or trouble other than the defective vision and deformity. At present, O. D. healthy, V. $\frac{1}{6}$ in O. S., deciphered Sn. 60 at 1 m. There is on O. S. a pinkish white tumor 5 mm. in height, 8 mm. in vertical diameter at the base, and 1 ctm. in its horizontal diameter. It was nearly an oblique truncated cone, and four black hairs, the length of ordinary ciliæ, with numerous colorless ones, grew from its top.

The base horizontal line is situated half on the cornea. The corneal side is steeper than the scleral side, and the base more sharply defined. The cornea is hazy, $1\frac{1}{2}$ mm. around the base, and is lifted up above the surrounding cornea, which is elsewhere transparent. The iris reacts promptly; the anterior chamber is normal; the deeper media are transparent, and the fundus healthy.

The accompanying sketch, by Mr. H. T. Carris, of Philadelphia, in water-colors, very perfectly represents the appearance of the growth, which is undoubtedly a dermoid cyst. The lower sketch represents the appearance presented with the eye turned strongly toward the nose. The patient has not yet consented to its removal.

AN OPERATION FOR ENTROPION.

BY DR. JOHN GREEN,

ST. LOUIS, MO.

By permission of the society, I offer for publication in its Transactions a description of the operation for entropion of the upper eyelid, which I have performed almost exclusively for the past five years, and which, in my hands, has afforded thoroughly satisfactory results, and far better than I have seen after any of the operations usually described in the text-books.

The operation is especially designed for cases of cicatricial entropion of the upper eyelid, following trachoma—cases in which, through the cicatricial contraction of the conjunctiva and underlying tissues, the tarsus becomes incurved, and the posterior lip of the free margin of the lid is drawn upward, so that the ducts of the Meibomian glands come to open backward against the eyeball, and the whole lid-margin appears narrowed, as it might appear if its posterior angle were shaved off.

In many cases of this affection the cilia along the whole lid-margin become inverted, constituting a typical entropion; in others the effect of the traction is less obvious, and the row of eyelashes may preserve a direction very nearly normal, but with here and there single lashes or small groups of lashes diverted from their place in the general ranks and turned backward so as to rub upon the globe—a condition known as trichiasis,[1] and constituting one of the commonest forms of that affection.

To both these classes of cases the operation under consideration is perfectly applicable, and that in the very worst cases I have met with, as well as in those of lesser deformity.

The operation consists essentially of three stages, although in particular cases the second and third stage may be modified, or even omitted.

[1] Occasionally a complete row of cilia becomes diverted in this way from the general ranks, and the case may then be called a distichiasis, if one cares to multiply names.

1. *Incision of the conjunctiva and tarsus.*—This incision is made in a line parallel to, and generally about two millimetres distant from the row of openings of the ducts of the Meibomian glands; it is carried through the entire thickness of the tarsus, and should extend, in cases of complete entropion, from near the inner to the outer canthus. The position and extent of the incision are indicated in Fig. 1.

The incision of the tarsus is most conveniently effected by the use

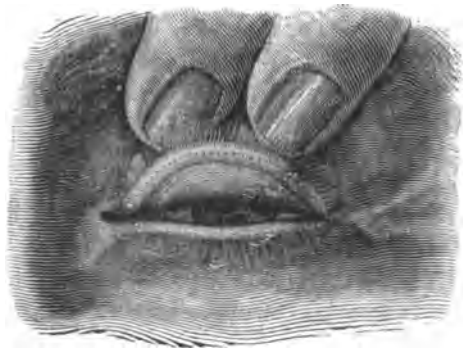


FIG. 1.

of the round-pointed scalpel shown, of two-thirds its actual size, in Fig. 2; it may be readily extended at either end, if necessary, by means of strong scissors. The lid is everted and held securely by the fingers, taking care to keep the eyelid and fingers dry to prevent slipping. There is no need of any instrument to hold the eyelid while making the incision; in fact, I have seen cases of positive injury to

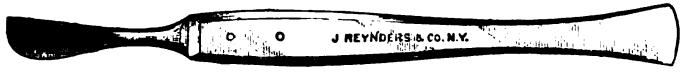


FIG. 2.

the tissues attributable to Snellen's clamp-forceps, even when they have been carefully used.

The effect of this incision is to separate the entire lid-margin from the body of the tarsus, and thus to permit it to be easily everted and held without strain in its new position.

2. *Excision of a narrow strip of skin.*—The strip of skin to be

excised should not exceed one and a half or two millimetres in width, and should taper to a point at each end; its lower boundary should be about one millimetre and a half above the line of the eyelashes. Only the skin and adherent connective tissue should be removed, leaving the orbicularis fascia and muscle intact; the nutrition of the loosened lid-margin is thus perfectly maintained through the vessels of the muscular layer. Fig. 3 shows the position and dimensions of the strip of skin to be excised.

3. *The placing of the sutures.*—The curved suture needle is a No.

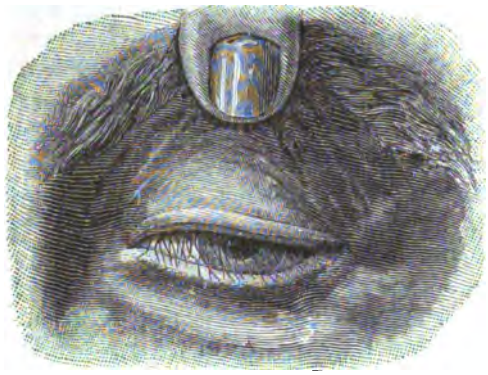


FIG. 3.

12 glover's needle bent to an arc of about a third of a circle; it is threaded with fine silk, and is held in any convenient needle-holder.

Fig. 4 shows the upper lid in vertical section, and illustrates the manner of placing the sutures.

The needle is first introduced a little to the conjunctival side of the row of eyelashes, and is brought out just within the wound made by the excision of the strip of skin (Fig. 4, A); it is then drawn through, inserted again in the wound near its upper margin, and passed deeply backward and upward so as to graze the front of the tarsus and emerge through the skin of the eyelid a centimetre or more above its point of entrance (Fig. 4, B). On tying the two ends of the thread together the skin-wound is closed, and the loosened lid-margin is at the same time everted and brought into a correct position. There is very little tension upon the stitches, and there is never

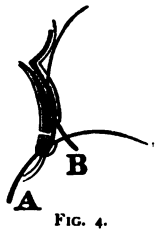


FIG. 4.

any injurious strangulation of the included tissues. Three sutures generally suffice for the accurate adjustment of the lid-margin. In the spaces between and beyond the sutures it is often practicable and advantageous to turn the eyelashes upward against the front of the eyelid, and fix them there by means of collodion; proceeding in this way it is often possible to remove one or more of the sutures as soon as the collodion has become dry, or even in some cases to dispense with them altogether.

The stitches should be removed, at latest, the day after the operation, reinforcing the line of suture by collodion as has just been indicated, or, in case the cilia are very short, using a few short fibres of cotton with the collodion.

The healing of the skin-wound is usually complete in the course of from two to five days; the incision in the tarsus gapes widely upon the conjunctival aspect of the lid, and heals by granulation, requiring usually about three weeks for complete cicatrization. The conjunctival scar is smooth, and not more conspicuous than those often seen as the result of trachoma. In a few cases a fungoid growth appears in the conjunctival wound, such as is occasionally observed after operations for strabismus or for the enucleation of the globe; it may be snipped off with scissors, and does not ordinarily tend to recur. In a few other cases a little fulness of the marginal tissues is developed, forming a slight protrusion near the middle of the lid, and requiring sometimes a slight secondary operation for its correction.

The results obtained by this method of operating are most satisfactory; the eyelashes are perfectly preserved, and grow luxuriantly in their corrected position, and there is generally no tendency to relapse, except in a few cases in which the operation has been performed during the active stage of trachoma. There is no appreciable shortening of the integument of the eyelid, and, after a few weeks, no visible cicatrix.

In typical cases of entropion the position of the row of eyelashes is perfect from the time of the operation. In cases complicated with trichiasis a most gratifying phenomenon is observed, viz.: the gradual rectification of the position of the deviated single cilia, or groups of cilia, which fall into line with their fellows so that all traces of irregularity ultimately disappear.

Another important feature in the cure is the very perfect renewal of the posterior lip of the lid-margin in cases in which it has been

apparently completely effaced by the disease. This renewal is very remarkable, and results also in the restoration of the openings of the Meibomian glands to their normal position upon the free margin of the lid.

A very great advantage which this operation offers over most others lies in the fact that it may be repeated, if necessary, upon the same eyelid. It is therefore perfectly applicable to cases in which the trachomatous process is still active, and I often perform it in such cases with the effect of materially hastening the cure of the trachoma. It is especially applicable also to cases in which large pieces of skin have been cut away from the lid in the vain hope of thus curing the inversion of the cilia; also in cases of an unsatisfactory result following Arlt's operation. In these latter cases I do not ordinarily excise any skin, but sometimes dissect upward a little between the tarsus and the orbicularis muscle, after having incised the tarsus in the manner described. The rectification of the position of the loosened lid-margin is then effected, if necessary, by the use of collodion.

The incision of the conjunctiva, and probably also of the tarsus, parallel to the lid-margin, is mentioned by Celsus under the name *subsectio palpebræ*. In slight cases of incurvation this incision is often very effective in restoring the lid-margin to its normal width, and the Meibomian gland openings and cilia to their normal position and direction; its effect may be considerably increased by the use of collodion to plaster the eyelashes up against the skin of the eyelid, thus effectively utilizing the row of cilia as levers to turn the lid-margin forward, and to maintain it in that position as long as may be desired. A similar incision was employed by Crampton and his followers, but always as an adjunct to the two vertical cuts through the whole thickness of the eyelid which constitute the characteristic feature of Crampton's operation.

Other surgeons—von Ammon, Jaesche—have practised a longitudinal section through all the layers of the eyelid—conjunctiva, tarsus, muscle, and integument—thus isolating a bridge of marginal tissue, which remains attached only at its two ends, and which is, therefore, liable to be destroyed by sloughing or injured by ulceration. To avoid this danger the section, *tarsotomia horizontalis* of von Ammon, has generally been made at a considerable distance (6 mm.) from the lid-margin, and therefore not in the best place for correcting its position and the direction of the eyelashes. G. Jaesche

alone appears to have made the section nearer to the lid-margin; but, as Arlt reports him, he made it of limited length, and performed it only in cases of partial entropion. Conjoined with this section, the excision of a very broad strip of skin (6 mm. to 1 ctm. and even more in height) has always been directed; and it has been thought to be important to suspend the loosened lid from the forehead by means of sutures, as was done also by Crampton.

The operation described in this paper has been the outgrowth of successive variations from old and well-known methods. Beginning with Arlt's operation, the first variation consisted in preserving the muscular layer of the lid intact, for the purpose of maintaining, through its vessels, the integrity of the marginal bridge bearing the cilia.[1] Next followed the trial of Jaesche's method, as described by E. Jaesche (*Klinische Monatsblätter für Augenheilkunde*, 1873), but excising a much narrower strip of skin, and applying the sutures so as strongly to evert the whole lid-margin, but without making use of the suspending threads employed by Jaesche. Lastly, it was found to be much better to confine the principal incision to the conjunctiva and tarsus, and thus to avoid severing the vascular connection of the loosened lid-margin.

I communicated a short description of this operation, substantially as I have now given it, to the Fifth International Ophthalmological Congress, New York, 1876, and called it, somewhat inaccurately, a modification of von Ammon's *tarsotomia horizontalis*. Experience with the operation during the four years which have elapsed since that publication has but confirmed my earlier impressions in its favor as the best general method known to me for the correction of entropion of the upper lid, whether simple or complicated with trichiasis. Two variations from the general method as I have described it have appeared to me to be useful in particular cases, viz.: the omission to excise the strip of skin in cases in which the integument of the lid is already deficient, and the substitution of collodion for the sutures, in part or altogether, in cases in which the eyelashes are long and well preserved.

Canthoplasty is frequently indicated in conjunction with this operation, and should generally be performed at the same time. In the

[1] This change in the plan of his operation was made by Arlt also, and was first published by him, so far as I know, in 1874, some two years after I had independently adopted it.

greater number of cases, however, it is superfluous, and may even be harmful.

NOTE.—Since the first publication of this operation it has been several times referred to by writers who have incorrectly stated that it is substantially or exactly the procedure of Burow, Sr. (*Berliner klinische Wochenschrift*, June 23, 1873). Burow's operation consists: first, in the incision of the tarsus in the position described and figured in the text, but with the difference that the incision is made to include the whole thickness of the lid, with the exception of the cutis; second, in the excision of a fold of integument, which, however, is expressly stated to be a *broad* fold, in order that the traction of the stretched skin may hold the tarsal incision open upon its conjunctival aspect during the whole period of healing by granulation; and third, in the closure of the skin-wound by *superficial* sutures, which are said to have been allowed to remain in some cases as long as five or six weeks without causing suppuration.

The procedure of Burow, in all its essential features, is fully described in Himly (Berlin, 1843, pp. 136, 11, and 129, 5, *d*) as one of the methods advocated by Celsus, Ætius, and Paul of Ægina. The especial value of my own method depends, as I believe, upon points of detail in which it differs from the older operations, viz.: the preservation of the vascular connection of the loosened lid-margin through the muscular layer, the narrowness of the excised strip of skin, the manner of applying the sutures, and the use of collodion to glue the eyelashes against the front of the eyelid, thereby taking advantage of the leverage of the cilia as an additional and efficient means of maintaining the lid-margin in its corrected position.

PHOTOGRAPH OF THE FOVEA CENTRALIS OF THE RETINA.

By Dr. O. F. WADSWORTH,

BOSTON, MASS.

(With Photograph.)

At the meeting of the society in 1873, I showed two sections running horizontally through the fovea centralis of the retina, under the microscope. For the photograph of one of those sections, now presented, I am indebted to the kindness and skill of Prof. J. W. S. Arnold, of New York. Other attempts have been made to photograph the sections, but none has proved so successful, on the whole, as this.

Though this picture is not an exception to the rule that photography offers a very imperfect means of representing the microscopic details of animal tissues, it may yet be regarded as of interest for two reasons: because illustrations of but very few sections through the fovea, schematic or other, are to be found; and because, in a photograph directly from the section, there can be no question of personal equation on the part of the draughtsman.

The section is from the eye of a girl of four years, removed in May, 1871, on account of a total staphyloma of the cornea so large as to be troublesome. The eye was placed in Müller's fluid immediately on removal, and some weeks later transferred to alcohol. It had been expected that the retina would be found atrophied to some extent. It proved, however, microscopically normal in every respect. As is evident from the section, there was no plica centralis, and this was probably due, in part at least, to the fact that the vitreous was so albuminous as to be solidified by the preserving fluids used.

The divided line beneath the section represents, as estimated by careful measurements, a length of 1 mm. in the actual section.

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CONTENTS.

PAGE

MEMBERS OF THE SOCIETY 179

MINUTES OF THE SEVENTEENTH ANNUAL MEETING 183

On the Administration of Anæsthetics in Bright's Disease of the Kidneys, and on Some Cases of Sudden Death after Cataract Operations. By WILLIAM F. NORRIS, M.D., Philadelphia, Pa. 189

One Hundred Cases of Cataract Extraction, with a Single Failure; with a Discussion of the Advantages of Non-Anæsthesia in this Operation. By HASKET DERBY, M.D., Boston, Mass. 195

A Peculiar Expression of the Eyes of the Color-Blind. By B. JOY JEFFRIES, M.D., Boston, Mass. 208

A Case of Persistent Hyaloid Artery (with Chromo-Lithograph Drawing). By WILLIAM S. LITTLE, M.D., Philadelphia, Pa. 211

An Operation for Closed Pupil, with Anterior Synechia, using the *Pince-Ciseaux* of Wecker. By JOHN GREEN, M.D., St. Louis, Mo. 214

Congenital Paralysis of Both Abducens and Both Facial Nerves. By G. C. HARLAN, M.D., Philadelphia, Pa. 216

The Treatment of Scars of the Face Involving the Eyelids, Directly or Indirectly. By CHARLES STEDMAN BULL, M.D., New York 219

A Source of Danger in the Frame of the Eye-Glass as Commonly Manufactured. By F. B. LORING, M.D., Washington, D. C. 223

Report of a Case in which Useful Vision was Maintained Through a Number of Years by the Aid of a Totally Dislocated Lens. By SAMUEL THEOBALD, M.D., Baltimore, Md. 225

The Comparative Value of the Mydriatics. By S. D. RISLEY, M.D., Philadelphia, Pa. 228

Two Cases of Sarcoma of the Choroid, Presenting Unusual Clinical Features. By CHARLES J. KIPP, M.D., Newark, N. J. 258

PAGE

A Case of Sudden and Complete Loss of Vision after Large Doses of Quinine. By F. BULLER, M.D., Montreal, Canada..... 262

A Case of Marked Narrowing of the Field, with Diminished Acuity of Vision, Following the Use of Duboisia, and Presumably a Result of the Use of that Drug (with Woodcuts). By J. P. WORRELL, M.D., Terre Haute, Ind..... 273

Intermittent Concomitant Convergent Strabismus. By G. C. HARLAN, M.D., Philadelphia, Pa..... 277

A Case of Hemorrhage near the Macula Lutea, from Concussion. By DANIEL B. ST. JOHN ROOSA, M.D., New York..... 278

Optico-Ciliary Neurotomy. By O. F. WADSWORTH, M.D., Boston, Mass.. 280

On Some Therapeutical Applications of Pilocarpine. By JOHN GREEN, M.D., St. Louis, Mo..... 302

The So-called Cure of Cataract by Electricity. By H. D. NOYES, M.D., New York..... 305

Pulsating Exophthalmos. By H. D. NOYES, M.D., New York..... 308

Modification of Snellen's Forceps for Entropion Operations. By H. D. NOYES, M.D., New York..... 311

A Pulsating Tumor of the Orbit. By HENRY S. SCHELL, M.D., Philadelphia, Pa..... 312

A New Trial Glass Frame (with woodcuts). By S. D. RISLEY, M.D., Philadelphia, Pa..... 314

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DR. R. W. HOOPER.....Boston, Mass.
DR. E. REYNOLDS.....Boston, Mass.
DR. C. SCHWEIGGER.....Berlin, Prussia.

Total..... 4
Whole number.....84

MINUTES OF THE PROCEEDINGS.

SEVENTEENTH ANNUAL MEETING.

Held in the City of Newport, July 27 and 28, 1881, at the Masonic Building, corner of Church and School Streets.

NEWPORT, *July* 27, 1881.

THE Society was called to order at 10 A.M., by the President, DR. HENRY D. NOYES, of New York.

The first business was the appointment of committees, and the Chair appointed the following:

COMMITTEE ON MEMBERSHIP.

DRS. HASKET DERBY, of Boston; W. H. CARMALT, of New Haven; JOHN GREEN, of St. Louis; GEORGE C. HARLAN, of Philadelphia; and ARTHUR MATHEWSON, of Brooklyn.

COMMITTEE ON BULLETIN.

DRS. GEORGE STRAWBRIDGE, of Philadelphia, and H. G. MILLER, of Providence.

AUDITING COMMITTEE.

DR. O. F. WADSWORTH, of Boston.

The Treasurer, DR. RICHARD H. DERBY, of New York, read his report, which was referred to the Auditing Committee and approved.

The report of the Committee on Membership was read by DR. HASKET DERBY, Chairman. The following candidates were recommended for membership: Dr. H. W. Bradford, of Boston; Dr. S. C. Ayres, of Cincinnati; Dr. W. F. Mittendorf, of New York; Dr. J. P. Worrell, of Terre Haute.

Upon ballot, these gentlemen were elected members of the Society. The name of Dr. A. Alt, of St. Louis, proposed by Drs. J. Green and C. J. Kipp, was presented for membership.

The report of the Committee on Bulletin was received, and the following was the order in which papers were read:

1. The first paper was by Dr. William F. Norris, of Philadelphia, "On the Administration of Anæsthetics in Bright's Disease of the Kidneys, and on Some Cases of Sudden Death after Cataract Operations."

It was discussed by Dr. A. Mathewson, after which a paper entitled

2. "One Hundred Cases of Cataract Extraction, with a Single Failure; with a Discussion of the Advantages of Non-Anæsthesia in this Operation," was read by Dr. Hasket Derby, of Boston.

The papers read by Drs. Norris and Derby were then discussed by Drs. D. B. St. John Roosa, George Strawbridge, H. W. Williams, W. H. Carmalt, the President, O. F. Wadsworth, J. S. Prout, B. Joy Jeffries, C. J. Kipp, and the authors.

3. "The Peculiar Look of the Color-Blind." By Dr. B. Joy Jeffries.

4. "A Case of Persistent Hyaloid Artery." By Dr. W. S. Little.

5. "A Contribution to the Study of Glaucoma (Cases)." By Dr. W. S. Little.

The last paper was discussed by the President, who mentioned two cases where he had removed the entire iris.

Dr. John Green then read a paper entitled

6. "Iridotomy, with Division of an Anterior Synechia, by the Use of Wecker's Pince-Ciseaux."

7. "Case of Congenital Paralysis of the Sixth and Seventh Nerves." By Dr. George C. Harlan.

8. "Cicatrices of the Face, Involving the Eyelids and Orbit, and the Means to be Adopted for Remedying the Defects which they Produce."

9. "Malignant Disease of the Bones of the Orbit and Face." Both by Dr. C. S. Bull (by title).

10. "A Source of Danger in the Eye-Glass Frame as Commonly Manufactured." By Dr. Francis B. Loring.

11. "Report of a Case in which Useful Vision was Maintained through a Number of Years by the Aid of a Totally Dislocated Lens." By Dr. Samuel Theobald.

The paper was discussed by Drs. G. C. Harlan, H. W. Williams, and the President.

12. Dr. Hasket Derby then exhibited Dr. H. W. Bradford's "Electro-Magnet," and cases were reported in which this or a similar instrument had been used by Drs. C. J. Kipp, B. Joy Jeffries, and the President.

13. "The Comparative Value of the Mydriatics in Ophthalmic Practice." By Dr. S. D. Risley, of Philadelphia.

The paper was discussed by Drs. John Green, F. B. Loring, S. Theobald, William F. Norris, W. S. Little, D. B. St. John Roosa, E. W. Bartlett, S. C. Ayres, O. F. Wadsworth, and the President.

The Society then adjourned to meet at 7.30 P.M.

FIRST DAY—EVENING SESSION.

The Society was called to order at eight o'clock, by the Vice-President, DR. WILLIAM F. NORRIS, of Philadelphia.

14. The first paper was read by Dr. Charles J. Kipp, of Newark, N. J., and entitled "Two Cases of Sarcoma of the Choroid Presenting Unusual Clinical Features."

It was discussed by Drs. John Green, J. F. Noyes, O. F. Wadsworth, and the President.

Dr. S. Theobald, of Baltimore, then read a paper on

15. "What Constitutes Insufficiency of the Internal Recti Muscles?"

It was discussed by Drs. O. F. Wadsworth, R. H. Derby, D. B. St. John Roosa, John Green, S. D. Risley, G. Hay, G. C. Harlan, F. Buller, the President, and the author.

16. "Weak Eyes in the Schools of Philadelphia." By S. D. Risley, M.D., of Philadelphia.

The paper was discussed by Drs. O. F. Wadsworth, W. S. Little, and the author.

Dr. Charles H. Williams, of Boston, reported, with remarks,

17. "Two Cases in which he had Removed Steel Chips from the Eye by Means of the Electro-Magnet."

The Society then adjourned to meet Thursday at 9.30 o'clock.

SECOND DAY—JULY 28, 1881—MORNING SESSION.

The Society was called to order at 9.30 A.M., by the President.

The Secretary read the minutes of the previous sessions, and they were approved.

Dr. Carmalt moved that all papers read in session be referred to the Publishing Committee, with power to print or reject them. This motion was seconded and carried.

Dr. Kipp requested the privilege of obtaining an abstract of the proceedings for publication in the *Archives of Ophthalmology*. Granted.

A similar request made by the stenographer, Dr. W. M. Carpenter, was granted for the *Medical Record*.

18. The first paper was read by Dr. F. Buller, of Montreal, and entitled "A Case of Sudden and Complete Loss of Vision after Large Doses of Quinine."

It was discussed by Drs. John Green, D. B. St. John Roosa, and S. D. Risley.

19. Dr. John Green then read a paper "On Marked Narrowing of Field, with Diminished Acuity of Vision following the Use of Duboisia, and Presumably Due to the Use of that Drug." By Dr. J. P. Worrell, of Terre Haute, Ind.

20. Dr. George C. Harlan, of Philadelphia, then reported "A Case of Intermittent Concomitant Convergent Strabismus."

It was discussed by Dr. S. Theobald and the author.

21. Dr. D. B. St. John Roosa, of New York, reported "A Case of Concussion of the Vitreous, Choroid, and Retina by a Bullet."

It was discussed by Drs. O. F. Wadsworth, G. Hay, and the President.

22. "Neurotomy of the Optic and Ciliary Nerves." By Dr. O. F. Wadsworth, of Boston.

The paper was discussed by Drs. C. J. Kipp, F. Buller, S. D. Risley, and the President.

23. "Observations on Some Therapeutical Applications of Pilocarpine" was the title of a paper read by Dr. John Green, of St. Louis.

It was discussed by Drs. S. Theobald and S. D. Risley.

Verbal Communications.

Dr. S. Theobald, of Baltimore, exhibited a set of lachrymal probes. Also a bandage constructed so as to prevent the puckering of the binocular eye-piece.

Dr. H. D. Noyes, of New York, reported a case of so-called "Cure of Cataract by Electricity." He also reported a case of "Pulsating Exophthalmos," cured by the ligation of the blood-vessels.

Dr. John Green spoke of the use of Snellen's clamp as a forceps in the operation for entropion.

Dr. H. D. Noyes described a modified operation for preventing wrinkling of the pedicle of the flap brought down from the forehead, in plastic operations for removing the deformity due to extensive removal of tissue in cases of epithelioma of the inner angle of the orbit.

Dr. W. H. Carmalt reported "A Case of Traumatic Arterio-venous Aneurism."

Dr. S. D. Risley spoke of the difficulty in making a diagnosis of tumors of the orbit, and related a case.

Dr. George C. Harlan reported a case similar to that reported by Dr. Carmalt; also a case of "Congenital Aneurismal Varix."

The following papers were read by title:

1. "On the Clinical Resemblances between Sound and Color."

2. "Bony Growth of the Conjunctiva."

3. "A Remarkable Case of Splenic Disease, with Retinitis Leucæmica." All by Dr. E. G. Loring.

4. "A Case of Pulsating Tumor of the Orbit." By Dr. H. S. Schell.

5. "Ulceration of the Cornea, Relieved by the Removal of Cerumen from the Ears." By Dr. James A. Spalding.

The Committee on Membership nominated the following officers for the ensuing year:

President—HENRY D. NOYES, of New York.

Vice-President—WM. F. NORRIS, of Philadelphia.

Secretary and Treasurer—RICHARD H. DERBY, of New York.

Corresponding Secretary—J. S. PROUT, of Brooklyn.

Committee on Publications—E. G. LORING, D. B. ST. JOHN ROOSA, of New York.

These gentlemen were all duly elected.

The Committee recommended for the next place of meeting, Lake George—or Newport, if proper accommodations at Lake George cannot be obtained.

Dr. F. B. Loring was added to the Committee, to arrange for the place for holding the annual meeting in 1882.

Upon motion the Society then adjourned.

RICHARD H. DERBY, *Secretary.*

Present at the seventeenth annual meeting:

DR. S. C. AYRES.
DR. EDWIN W. BARTLETT.
DR. F. BULLER.
DR. W. H. CARMALT.
DR. HASKET DERBY.
DR. RICHARD H. DERBY.
DR. LEWIS S. DIXON.
DR. JOHN GREEN.
DR. GEORGE C. HARLAN.
DR. GUSTAVUS HAY.
DR. B. JOY JEFFRIES.
DR. CHARLES J. KIPP.
DR. W. S. LITTLE.
DR. F. B. LORING.
DR. ARTHUR MATHEWSON.
DR. H. G. MILLER.
DR. WILLIAM F. NORRIS.
DR. HENRY D. NOYES.
DR. J. F. NOYES.
DR. J. S. PROUT.
DR. SAMUEL D. RISLEY.
DR. D. B. ST. JOHN ROOSA.
DR. GEORGE STRAWBRIDGE.
DR. S. THEOBALD.
DR. J. J. B. VERMYNE.
DR. O. F. WADSWORTH.
DR. CHARLES H. WILLIAMS.
DR. HENRY W. WILLIAMS.

ON THE ADMINISTRATION OF ANÆSTHETICS IN BRIGHT'S DISEASE OF THE KIDNEYS, AND ON SOME CASES OF SUDDEN DEATH AFTER CATARACT OPERATIONS.

By WILLIAM F. NORRIS, M.D.,

PHILADELPHIA, PA.

I PROPOSE to call the attention of the society for a few moments to the record of two cases of death supervening unexpectedly after operations for cataract, which occurred within a few weeks of each other in my practice, during the spring of the current year. They present four features in common; 1st, they were both anæsthetized with sulphuric ether; 2d, they entirely recovered consciousness; 3d, they died comatose—one a few hours, the other eighteen days after the operation; 4th, in both cases a careful autopsy revealed no organic lesion, except Bright's disease of the kidneys. In my opinion both deaths were due to the same cause, namely, the congestion caused in already diseased kidneys by the administration of ether.

CASE I.—A child, five months old, with congenital cataract, whose parents maintained that it had always been healthy since birth, and that it had had no convulsions or other symptoms of serious disease. The child was etherized by the family physician with a small quantity of Squibb's ether on a towel, while it lay in its mother's arms, and was, when insensible, placed on a table, where a very moderate discission of the anterior capsule and of the anterior fibres of the lens was made without accident, in the usual way. This was between 3 and 4 P.M. The child readily recovered consciousness, and was sufficiently itself to nurse its mother's breast. Nevertheless, it remained fretful, and at 6 P.M. it had a convulsion, which was followed by others, and it died comatose at 8 P.M. An autopsy was held the next day at 12 M., and a very careful examination made of the brain, heart, lungs, and abdominal viscera; but, beyond congestion of the brain and its membranes, and a similar state of the lungs, there was

no demonstrable lesion in the body, except fatty degeneration of the kidneys. These organs were not granular, but presented yellow splotches of parenchymatous fatty degeneration. After hardening some portions in alcohol, others in Müller's fluid, sections were made, which under the microscope showed intense congestion of the kidneys, the veins and capillaries being gorged with blood, both in the cortical substance and in the straight tubes. Indeed, these vessels were so distended, that in specimens double-stained with indigo-carmine and carmine (a process which stains the red blood-corpuscles apple-green), they looked under a low power as if an artificial green injection had been forced into them. The parenchyma showed areas of cloudy swelling and fatty degeneration of the epithelium, most pronounced in the cortical substance. The mother of the child appeared healthy, the father emaciated and cachectic. There is no history of hereditary disease of the kidneys in either side of the house. They have had in all six children, three healthy (then, after a visit of the father to Europe), two miscarriages, and lastly, the child whose history and death are here recorded.[1]

CASE II.—A lady, sixty-eight years old, dark, rather yellowish complexion, hazel eyes, black eyebrows and hair, the latter beginning to be gray. Apparently in good health, thin, but active. Marked arcus senilis in each eye; ripe senile cataract, with good light-perception in right eye; and, except very moderate gouty enlargement of the knuckles of each hand, no marks of disease. She claimed to have always been free from any severe disease, but at times to suffer from what she called "wind colic," which she thought due to indigestion and congestion of the liver. Her family physician, who had known the household intimately, both as a friend and a doctor, for many years, was not aware of any organic disease.

The operation of extraction was performed on the right eye, the

[1] It would be foreign to the purpose of these brief clinical notes to enter into the discussion of the question of the frequency of Bright's disease of the kidneys in infants, or of its hereditary occurrence; but it may be worthy of mention that Steiner and Neurutter (Prager Vierteljahrschrift für praktische Heilkunde, 1870, p. 88) give reports of autopsies in 265 cases of Bright's disease in children; and Adolph Kjellbing, in the Journal der Kinderkrankheiten, 1870 (as quoted on p. 442, Biennial Retrospect, New Sydenham Soc., 1869–70), after citing the dicta of Billard, Valleix, Bouchut, Vogel, and Gerhardt, as to its extreme rarity, says that the numerous autopsies made at the Children's Hospital of Stockholm show that parenchymatous disease of the kidneys is frequent in children, most frequent in measles and intestinal catarrh, and that in pneumonia, out of 260 cases, 33 had Bright's disease.

patient being fully under the influence of ether. A small upward corneal flap was made by a Graefe's knife, leaving a considerable conjunctival flap, from which and from the iridectomy there was considerable hemorrhage. The cornea collapsed as soon as the aqueous was evacuated. The anterior capsule was tough and had white spots of degeneration on it, and the lens was, therefore, removed with a wire loop, but with the loss of only a few drops of vitreous. The patient recovered readily from the anæsthetic, but I noticed, with considerable anxiety, that during that evening and on the day following she was thirsty and feverish, pulse 100, tongue coated with a heavy yellow fur, and the urine, which was diminished in quantity, was passed very frequently, and was heavily laden with urates. I was inclined to think I had before me the commencement of a panophthalmitis, but there was no pain or swelling of the eye, and the wound healed kindly. On the fourth day she got up, and daily afterward, for nine days, sat up several hours each day. At the end of two weeks the bandages were removed, and the patient, much pleased to find that she could see the pictures on the wall of her room, and that with $+\frac{1}{2}$ sp. she could tell the time on a watch; but, although the eye improved steadily, yet slowly, the general symptoms still continued unfavorable. The patient did not gather strength; the pulse remained about 100. the tongue heavily coated, and she complained occasionally of "wind colic," with discomfort and pain, mainly along the course of the colon. She was allowed milk-toast, beef essence, scraped beef, etc., with ice-water in moderate quantities; neutral mixture and sweets spirits of nitre were exhibited to allay her fever, while her colic and tendency to constipation were combated by the administration of blue mass and compound extract of colocynth. Sixteen days after the operation I was summoned with the statement that she was delirious, and found her mind wandering, although by a sharp question she could be gotten to give a sensible reply. On the evening of the same day she was worse, and on the following days entirely wandering in her mind. On the seventeenth day after the operation, at eight o'clock A.M., her pulse was 108, temperature 100°, respiration 30, with bronchial mucous râles in the chest. The urine was examined, not because any kidney disease was demonstrable from the symptoms, but rather to obtain a more complete understanding of the case, and it was found to have a specific gravity of 1008, a small amount of albumen (after settling in the test-tube, one-ninth the bulk of the urine), and the microscope showed triple phosphates and urates, with fatty and granular casts.

Brandy and digitalis were administered in moderate doses, but the patient became comatose, and died on the eighteenth day after the operation, the operated eye being entirely healed and quiet.

An autopsy showed a healthy brain; lungs crepitant throughout; heart with normal valves, but slight hypertrophy of the walls of the left ventricle; liver, spleen and other abdominal viscera healthy, except the kidneys, which were decidedly granular.

The microscope showed great congestion, marked increase of the interstitial connective tissue, fatty degeneration of the epithelial cells, and numerous casts in situ in the straight tubes.

It is, I believe, a universally admitted fact that chronic Bright's disease in its advanced forms is a grave complication of any operation, and Paget, in his "Clinical Lectures and Essays," pp. 39, 40, 1875, speaks most emphatically on the subject, saying: "I do not know by how many times the risks of a given operation are increased in any patient who has albuminuria, but I do know that you will find it a safe rule never to perform any operation without an acquaintance with the manner in which the patient's kidneys perform their functions; and *never to perform one, except under something like compulsion, on a patient whose urine is constantly albuminous.*"

That this is not too strongly stated, my own early experience affords confirmatory evidence in the death of a patient twelve days after cataract extraction, where no anæsthetic was administered, and where a post-mortem examination showed marked Bright's disease of the kidney. J. L., seventy-nine years of age, with unusually marked rigidity of the radial arteries. *No anæsthetic.* Peripheric linear extraction. Operation in all respects normal, and patient immediately after counted fingers readily. The wound healed quickly, leaving a clear pupil; there was no inflammation of the eye, but mild senile delirium occurred, which, however, disappeared, and on the third day he got up with the nurse's help and walked about the ward. On the fifth day the tongue became dry, the cheeks flushed of a dusky red, and the wandering delirium returned. His stomach also became deranged, and he had nausea and indigestion. During the entire period he suffered from home-sickness, and worried about money. The sick stomach ceased, but the pulse became feebler, hardly to be felt in the rigid and calcareous arteries. He died on the twelfth day after the operation.

Autopsy.—Fatty kidneys, with numerous cysts; coronary arteries atheromatous, one nearly occluded by calcareous matter; radials,

vertebrals and carotids also calcified; a large fibrinous clot attached to the mitral valves; brain healthy.

While chronic albuminuria manifestly increases the risk of operations without anæsthetics, we find comparatively little said as to any increased risk from the employment of anæsthetics in these cases. Turnbull, however, distinctly recognizes increased risk from their administration; and in speaking of their use, in "Transactions of the American Medical Association," 1880, p. 292, says: "It is now a well-recognized condition, that in disease of the kidneys anæsthesia almost invariably produces coma and death."

These remarks, however, as well as most other references which I have been able to find on the subject, refer to the immediate danger of death on the operating-table. If, however, this is not the only danger—if the administration of ether can, in certain cases, so stimulate some latent forms of chronic Bright's disease as to cause decided interference with the functions of the kidneys, and death from uræmia, at an interval varying from some hours to two or three weeks after the operation, we have certainly additional and grave cause well to weigh the propriety of administering anæsthetics in all operations for chronic disease in persons with albuminuria, and certainly ought never to perform one without examining the urine of all cases to detect any latent disease of the kidneys, so that both the operator and patient shall be fully forewarned of the additional risk to life under such circumstances.

I believe that the two cases above detailed were both cases of uræmic poisoning, caused by the irritant action of the anæsthetic on a kidney with marked, although latent disease. In neither case was there any evidence of septic poisoning. In the first there was no time for its production; in the second no focus of unhealthy inflammation in the eye to start it, and no evidence of it at post-mortem; moreover, septic poisoning is usually accompanied by chills and high temperature (102°—104°), which were never present in this case.

I am aware that Snow,[1] writing on anæsthetics, says that death occurring so long after the administration of an anæsthetic should not be attributed to it; while Bigelow[2] thinks that in such cases death may or may not be accelerated by them. I am also aware that

[1] On Chloroform and other Anæsthetics, by Jno. Snow, M.D. 8vo, pp. 442. London, 1858.

[2] Anæsthetic Agents, by H. W. Bigelow, pp. 197-221 in the Trans. Amer. Med. Asso. for 1848.

anæsthetics are frequently administered in puerperal convulsions, and that ether is occasionally given to cases known to have Bright's disease of the kidney, without apparent evil results, and could cite two cases in the practice of my friends in this city, in one of which a patient known to have Bright's disease was twice successfully anæsthetized with ether for surgical purposes (scraping dead bone); and in another, under similar circumstances as regards the kidneys, ether was three times successfully administered for minor surgical operations; and I have no doubt that other surgeons could furnish many parallel cases; but, because fatal results do not follow in all cases, we have no right to shut our eyes to those where their employment apparently leads to fatal disturbance of the renal functions. We know that ethers are diuretics and largely excreted by the kidneys, and it is possible that in some cases it causes fatal congestion of these already diseased organs.

Emmett and Hunt, so far as I can find, are the only authors who distinctly recognize and state this remote danger of ether as distinguished from the immediate risk at the time of administration. The former, at p. 750 of the second edition of the "Principles and Practice of Gynæcology," details a case where ether was administered for the operation on a lacerated perineum, and the patient died in thirty-two hours with well-marked symptoms of *uræmic poisoning*. In his comments on this case, he remarks: "The case was reported, and in the report I called the attention of the profession to the greater necessity of examining the condition of the kidneys than that of the heart. Since then I had at least five deaths to occur from *uræmic poisoning* in public and in private practice, and these perhaps might not have occurred if my assistants had been able to examine or had appreciated the importance of examining the urine before the anæsthetic was given."

On the following page the same author states that, at the Women's Hospital, examination of the urine has become an established rule, and that, therefore, many cases of unsuspected kidney disease are discovered, which are treated by the administration of opium previous to the operation, instead of an anæsthetic during its performance.

Hunt (*Philadelphia Medical Times*, January 9, 1875) speaks in less decided terms, but gives a case where ether had to be desisted from at the time of operation, owing to the alarming depressant influence on the pulse; and when death occurred, about two weeks after the injury, with symptoms not pyæmic, but which at the time

were attributed to surgical fever, the kidneys were in a marked state of fatty degeneration. The writer asks: "May not conditions of this kind often explain the unpleasant and even fatal action of an anæsthetic?"

ONE HUNDRED CASES OF CATARACT EXTRACTION, WITH A SINGLE FAILURE; WITH A DISCUSSION OF THE ADVANTAGES OF NON-ANÆSTHESIA IN THIS OPERATION.

BY HASKET DERBY, M.D.,

BOSTON, MASS.

FOUR years ago I prepared, for the meeting of this society, a paper entitled "A Few Practical Suggestions concerning Extraction of Cataract" by the method of Graefe. Owing to the railway disturbances, a quorum of members failed to appear at Niagara, and no meeting was held. The paper was subsequently published in a local journal.[1]

A brief *résumé* of the points then insisted on forms a necessary introduction to the present statistics. They were:

First.—The use of myotics rather than of mydriatics, as preparatory to extraction—the principal advantage suggested being the lessened liability to subsequent prolapse of the iris into the corners of the wound.

Second.—The avoidance of anæsthetics. The diminished sensitiveness of the senile eye was alluded to. Anæsthesia induces congestion, which tends to further hemorrhage. It must be preceded by fasting, which goes to diminish the patient's courage and lessen his strength. Insensibility being once produced, all motion of the eyeball must be induced by dragging with fixation-forceps. The globe loses its tension. The patient can give no information as to the clearness of his acquired vision. And vomiting, if violent or prolonged, is an evident source of danger. Finally, the moral support of a single act of sight, indulged in before the bandage is finally applied, gives confidence and supplies hope, both important factors in aiding a patient to support the days of darkness that are before him.

Third.—It was advised that the lids be allowed to remain closed

[1] Boston Medical and Surgical Journal, November 1, 1877.

for at least seven days after the operation, and that, under ordinary circumstances, no examination of the eye be made during that time. This was based on the well-known fact that the first appearance of certain inflammatory complications was apt to follow the first exposure of the eye to air and light; and that, even in cases which did well, the whiteness and freedom from irritation about the site of the wound were always succeeded, after opening the eye, by a certain amount of temporary redness and irritation.

I now append the statistics of one hundred extractions in which these hints were acted on, and contrast them with a similar number of cases in which anæsthesia was employed, mydriatics used, and the eye examined within a shorter period after the operation than above advised—the whole occurring in my own practice. These cases were not selected, but were simply instances of hard, uncomplicated senile cataract. For the sake of convenience, they are grouped under two heads, viz., with and without anæsthesia. It is to be understood however, that those coming under the second head were operated on with the pupil under the influence of eserine, and that the eye, in each instance, was not examined for a week or more after the operation.

TABLE.

	100 Cases with Ether.	100 Cases without Ether.
Percentage of cases occurring in private practice	30	42
Average age	61.7	65.8
Loss of vitreous	14	9
Duration of treatment	18.3 days.	16.5 days.
Secondary operations	22	14

RESULTS.

Vision = 1	1	1
Vision = 0.9	..	3
Vision = 0.8	..	..
Vision = 0.7	6	4
Vision = 0.6	..	3
Vision = 0.5	1	8
Vision = 0.4	13	18
Vision = 0.3	20	12

	100 Cases with Ether.	100 Cases without Ether.
Vision = 0.2	22	31
Vision = 0.1	18	9
Success V. 0.1 and more	81	89
Partial success, V. $\frac{1}{12}$ to $\frac{1}{60}$, but including ability to get about unattended	8	9
Reasonable prospect of success on performance of secondary operation	2	1
Failure	9	1
	100	100

It will thus be seen that, of the first 100, 91 recovered, or are likely to recover, an appreciable amount of useful vision. Of the second 100, 99 were thus fortunate. The percentage of loss in the first series is confessed to be unduly large; and that that of the latter will be steadily maintained, by following out the method, it is not of course claimed. But that this method has had, in my hands, a decidedly greater measure of success than the other, there is no room for doubting; and it can safely be said that this increased success did not depend on additional experience in operating, or increased manual dexterity, due to practice.

The single case of failure in the second hundred was discharged from the hospital on the fifteenth day. Moderate inflammation had followed the operation, but, at the time of discharge, though the pupil was blocked with cortical remains, the anterior chamber had long been re-established, redness had disappeared, and there was good perception and projection. Not long after the patient had returned home, severe pain came on, followed by suppurative choroiditis, which ultimately necessitated enucleation.

The nine cases of failure in the first series were due, in six instances, to corneal suppuration; in two to cyclitis depending on the presence of cortical remains; and in one to panophthalmitis.

As has been already stated, none of these were selected cases, but taken in the order of their occurrence, in private and in hospital practice—uncomplicated senile cataracts, with good perception and projection. Of the second series a single case, however, has been skipped, and the hundred made up by adding what would properly be the hundred-and-first. A man, aged seventy-five years, very restless during the operation, the performance of which was thus ren-

dered unusually difficult, was discharged on the fifteenth day, with excellent perception of light, but with a pupil blocked with rapidly absorbing corticalis. He was ordered atropine, and told to report at regular intervals. This he promised to do, but, instead, returned at once to his distant home, probably abandoned all treatment and all care, as regards the use of the other eye, and is reported by letter to have undergone a painful inflammation, and lost the eye. I never saw him again, but think I am justified in rejecting the case from my list, as ordinary prudence and obedience to directions would, in all probability, have resulted in the restoration of useful vision.

In the annual reports of the Massachusetts Charitable Eye and Ear Infirmary for 1878 and 1880, it is undertaken to compare the results of operations for extraction performed with and without anæsthetics during these years. The percentage of success inclines, each year, very slightly in favor of the operations done without ether. I desire, however, to protest against the value of any inference from these statistics. The cases occurred in the practice of at least six surgeons—experienced operators, it is true, but using each his own method, and all previously accustomed to the regular employment of anæsthesia. Now, the object of this paper is not to claim that the *mere avoidance* of anæsthesia is likely to materially further the success of extraction, without an intelligent utilization of the advantages a state of consciousness places at our command. These advantages, as already stated, consist, in part at any rate, in the power of the patient to direct his eye by an effort of the will, and in his ability to inform the surgeon, at the close of the operation, as to the clearness of his vision. A surgeon who maintains the use of the fixation-forceps through the operation, dragging the eye-ball hither and thither by an instrument the application of which is exquisitely painful—and a surgeon who obtains what seems to him a clear pupil at the close of the operation, but closes the eye without testing vision, and going again to work, if the test be unsatisfactory, until clearer sight is obtained, fails to appreciate the advantages of non-anæsthesia, and is not entitled to point a moral by the results he secures. As my colleagues at the Infirmary have not, as yet, in all instances acted on this understanding, I cannot admit that their figures, good as they are, may not ultimately be improved.

The operations here reported were all performed according to the method of von Graefe, the single departure therefrom being in the cut itself, which was more corneal and less linear than that originally recommended by him. My present practice is to apply a one per

cent. solution of eserine, or, still better, a mixture of eserine and vaseline, of the same relative strength, an hour before operating. The morning hour is ordinarily selected, the patient being allowed to have a good breakfast, and occupying the bed in which he is to remain. I employ no assistant in the cases where ether is not given, an experienced nurse being found capable of giving all necessary help. Fixation-forceps are employed to hold the eyeball only until the counter-puncture is completed, and are not again used during the operation. It might be thought by some that the unrestricted motion of the eye would embarrass the performance of the iridectomy, but this I have not found to be the case. Introducing the forceps with the left hand, and using the scissors with the right, the patient being told to look down and cautioned against any sudden movement of the eye, the task of the operator has been found easy. I have only once had a slight dialysis. The moment the iridectomy is completed the speculum is removed, and now entirely dispensed with; the patient is allowed to rest a few moments, any hemorrhage being controlled by the external application of sponges dipped in ice-water; the upper lid is then raised and gently held against the edge of the orbit with the fingers of the left hand, while with the right the surgeon first divides the capsule, and then presses out the lens by means of the caoutchouc spoon applied on the outside of the lower lid, the patient the while looking down. Vision having been tested and found satisfactory, the corners of the iris are replaced with the rubber spatula, and a light compressive bandage applied. This bandage is changed the same evening, afterward once a day. The patient sits up in bed that afternoon, gets up in forty-eight hours, and has the bandage removed and the eye first opened on the eighth day. Any unusual complications are, of course, met by earlier examination.

No antiseptic precautions were taken in any of these cases.

ONE HUNDRED CASES OPERATED ON WITHOUT ANÆSTHESIA.

No.	Sex.	Age.	Remarks.	Length of Treatment in Days.	Secondary Operation.	Result.
1.	F.	87	.....	10	.....	0.2
2.	M.	64	.....	18	.....	0.4
3.	F.	61	Some capsule left in pupil.	14	Operation proposed.	0.15
4.	M.	61	Slight iritis.....	14	.....	0.1
5.	F.	56	Cataract immature; some cortical remained behind.	17	.....	0.4

ONE HUNDRED CASES OPERATED ON WITHOUT ANÆSTHESIA —(Continued.)

No.	Sex.	Age.	Remarks.	Length of Treatment in Days.	Secondary Operation.	Result.
6..	M.	61	Iritis; pupil filled with membrane.....	25	Capsule operation..	0.2
7..	F.	76	.....	14	.....	0.7
8..	F.	49	.....	14	.....	0.3
9..	F.	61	Cataract immature.....	15	.....	0.3
10..	F.	55	.....	18	.....	0.7
11..	M.	61	.....	16	.....	1.0
12..	M.	55	.....	16	.....	0.2
13..	F.	68	Hypermature; vitreous lost; iritis followed.....	27	Capsule operation...	0.2
14..	F.	60	Some loss of vitreous; tedious convalescence.....	35	.....	0.1
15..	F.	49	.....	15	.....	0.35
16..	M.	69	.....	10	.....	0.4
17..	M.	72	Patient rheumatic; iritis and closed pupil followed....	46	Secondary operation.	0.3
18..	F.	68	Iris tremulous; some loss of fluid vitreous; low iritis.	27	.....	0.05
19..	M.	69	....	10	....	0.25
20..	M.	41	.....	9	.....	0.33
21..	M.	60	.....	9	.....	0.15
22..	M.	62	Struck eye a severe blow during convalescence....	14	.....	0.25
23..	M.	71	Mild iritis.....	17	Capsule operation...	0.5
24..	F.	55	Six days later, hemorrhage into anterior chamber....	21	.....	0.5
25..	M.	73	Feeble; rheumatic; iritis and closure of pupil.....	47	Capsule operation...	0.2
26..	M.	78	... .	15	.....	0.25
27..	F.	72	Immature. Iritis.....	18	Secondary operation.	0.05
28..	M.	55	At discharge pupil filled with capsule; told to return.....	24	.....	0.2
29..	F.	57	Capsule in pupil; to return.	13	.....	0.1
30..	M.	77	.....	13	.....	<1.0
31..	M.	72	Pupil, at discharge, filled with capsule; to return..	13	.....	0.033
32..	F.	72	Slight loss of vitreous; scoop used; acute mania on sixth day.....	6	.....	0.2
33..	F.	60	....	13	.....	0.5
34..	M.	72	Senile delirium during convalescence.....	15	.....	0.2
35..	F.	60	Blow on eye five days after operation; iritis and closed pupil; to return.....	16	.....	Counts fingers at 1 metre.
36..	M.	60	.....	15	.....	0.5
37..	M.	60	Capsule in pupil; to return.	11	.....	0.06
38..	F.	89	.....	12	.....	0.2
39..	F.	63	Slight iritis.....	17	.....	0.7
40..	F.	76	.....	15	.....	0.1

ONE HUNDRED CASES OPERATED ON WITHOUT ANÆSTHESIA —(Continued.)

No.	Sex.	Age.	Remarks.	Length of Treatment in Days.	Secondary Operation.	Result.
41..	F.	75	.....	18	.....	0.2
42..	M.	77	Slight iritis.....	20	.....	0.2
43..	F.	65	Slight loss of vitreous.....	14	.....	0.4
44..	F.	63	Iritis.....	26	.....	0.2
45..	M.	70	Corticalis fluid; nucleus removed by scoop.....	14	.....	<1.0
46..	F.	65	....	12	.....	0.3
47..	M.	70	Capsule left in pupil.....	14	Capsule operation...	0.5
48..	M.	62	.....	16	Capsule operation...	0 4
49..	M.	78	.....	14	.....	0.3
50..	M.	72	.....	14	.....	0.2
51..	M.	70	Capsule left in pupil.....	14	Secondary operation.	0.33
52..	F.	58	Capsule left in pupil.....	17	Secondary operation.	0.33
53..	F.	68	Scoop used; slight loss of vitreous; iritis.....	31	.....	0.2
54..	M.	72	Capsule left in pupil.....	14	Capsule operation...	0.15
55..	F.	73	.....	16	.....	0.33
56..	F.	47	Subsequent examination discovered floating opacities in vitreous.....	14	.....	0.25
57..	F.	50	Some cortical could not be removed.....	16	Secondary operation.	0.2
58..	F.	60	Slight iritis.....	19	.....	0.16
59..	F.	62	....	14	.....	0.7
60..	M.	73	.....	14	.....	0.5
61..	F.	63	Patient had albuminuria....	14	... .	0.11
62..	F.	47	....	13	.....	0.3
63..	F.	60	Capsule in pupil at time of discharge; patient did not return.....	13	....	0.17
64..	F.	63	Patient had Bright's disease, of which she died within a year.....	21	.....	0.14
65..	M.	55	.....	14	.....	0.33
66..	M.	64	Iritis and closure of pupil..	18	Secondary operation.	1.0
67..	F.	67	Iritis.....	19	.....	0.5
68..	F.	77	Slight loss of vitreous in attempting to remove capsule.....	14	Secondary operation.	0.6
69..	M.	75	Very rheumatic; iritis followed, with closure of pupil.....	15	Secondary operation.	0.3
70..	F.	81	Much bleeding; lens very sticky; tedious convalescence.....	30	.....	nearly 0.1
71..	F.	78	Much hemorrhage, not wholly absorbed at discharge.....		.....	0.16
72..	F.	73	Capsule left behind; patient did not return for secondary operation.....	19	.....	0.07

ONE HUNDRED CASES OPERATED ON WITHOUT ANÆSTHESIA —(Continued.)

No.	Sex.	Age.	Remarks.	Length of Treatment in Days.	Secondary Operation.	Result.
73..	F.	65	.....	16	.....	0.25
74..	M.	77	Retinal separation discovered just before discharge.	16	.....	0.025
75..	F.	65	.....	18	Capsule operation...	0.5
76..	M.	73	.....	14	.....	0.3
77..	F.	66	Acute mania after operation, ungovernable; bandage removed; hemorrhage supervened.....	14 17	.....	0.07
78..	M.	62	.....	12	.....	0.4
79..	F.	68	Suppurative choroiditis on twentieth day; eye subsequently enucleated.....	15	.....	0.
80..	F.	63	.....	18	.....	0.3
81..	M.	68	.....	13	.....	0.25
82..	F.	63	.....	15	.....	0.4
83..	F.	52	.....	14	.....	0.33
84..	F.	72	.....	15	.....	0.3
85..	F.	76	.....	14	.....	0.25
86..	M.	51	.....	14	.....	0.3
87..	F.	69	Cataract immature; iritis; closure of pupil.....	18	Secondary operation.	0.5
88..	F.	39	Slight loss of vitreous.....	18	.....	0.5
89..	F.	70	.....	15	.....	0.33
90..	F.	75	.....	14	.....	0.2
91..	F.	71	Much capsule left in pupil; patient did not return, as requested.....	15	.....	0.05
92..	M.	72	Scoop used.....	13	.....	0.16
93..	F.	52	.....	13	.....	0.4
94..	M.	66	.....	11	.....	0.3
95..	M.	64	.....	12	.....	0.6
96..	M.	74	.....	11	.....	0.14
97..	M.	65	.....	12	.....	0.23
98..	M.	58	Slight loss of vitreous; scoop used.....	22	.....	0.16
99..	F.	70	Iritis.....	28	Secondary operation.	0.45
100..	M.	82	.....	16	.....	0.1

DISCUSSION ON THE PAPERS READ BY DRS. NORRIS AND DERBY (1 and 2).

DR. A. MATHEWSON, of Brooklyn, referred, as negative evidence upon the subject of Dr. Norris's paper, to the case of an old man who was the subject of chronic Bright's disease, and upon whom he had operated for cataract. The patient bore the anæsthetic and the operation perfectly well. The operation was that of extraction. He also added two cases in which death followed the administration of

ether and the operation of iridectomy. The operation was done quickly and while the patient was in the primary stage of anæsthesia. The autopsy revealed cerebral hemorrhage as the cause of death. In the other case kidney disease was suspected, although he had not demonstrated its existence by examination of the urine. No autopsy could be obtained.

Dr. D. B. St. John Roosa, of New York, hoped that gentlemen with a much wider experience than his own would join in the discussion, but he wished to contribute to it briefly. He wished to say in advance that he appreciated fully every word spoken by Dr. Derby, and the injunction he had given concerning opening the eye after extraction of cataract. Whatever might be the experience of other gentlemen, he believed that much was gained for the success of cataract operation by leaving the eye closed, as he was taught to do in the earliest period of his pupilage, as he was taught again not to do, but as was his present practice. During the last year he had had his share of experience in cataract operations in New York and in Vermont, and was convinced that to early opening of the eye might be ascribed some of the unfavorable results which occurred. Ingress of air and light was sometimes permitted at an early stage, and, so far as his experience went, he believed that it was the starting-point of inflammation in many cases.

He wished very much that he could agree so thoroughly with Dr. Derby concerning the use of anæsthetics, but it seemed to him that Boston patients must be much better trained, if not much better disciplined, than those which he saw. He had attempted on some occasions to train the patient so that he or she would be able to submit to the operation without the use of an anæsthetic; but, as strongly as he felt in favor of the point in Dr. Derby's paper, already alluded to, just so strongly he felt upon the other side with regard to the use of anæsthetics. He felt, in a large majority of cases, much safer while performing the operation with than without an anæsthetic. Even the sad experience of Dr. Norris concerning the injurious effects of ether upon patients suffering from kidney disease would not deter him from using an anæsthetic. It would cause him to be more careful in determining the condition of the kidneys prior to the operation; but even then, knowing as he did, from what he had been told by general practitioners who were experienced, how few people have sound kidneys, he believed that he would take the risk of anæsthesia, thinking that its benefit compensated for the possible dangers. The question could not be settled by elaborate statistics from one authority, but must be tested by the average outcome of professional experience, and it came down to the fact that a man has no real authority except his own experience, which he has compared as conscientiously and zealously as possible with that of men who were as wise or wiser than himself.

Dr. George Strawbridge, of Philadelphia, had been interested in both of these papers. With regard to Dr. Norris' paper he had particular reason to be interested. He thought there was one point

with regard to the giving or not giving of ether which was specially important. If we knew that the kidneys were decidedly diseased, and we were called upon to decide whether or not an anæsthetic should be administered, it would be found difficult in many cases, because of the great danger the patient would be placed in from shock, if the operation was performed without an anæsthetic. Undoubtedly the shock of the operation had been a prominent cause of death after this operation in many cases, and the question to be decided was: "Is the risk with ether greater than that from the shock of the operation itself?"

With regard to Dr. Derby's paper, he had not used ether in cataract extraction but twice, and he had not had any trouble in performing the operation without anæsthesia.

DR. H. W. WILLIAMS, of Boston, thought that the advantages attending the use of ether were considerable. He agreed with Dr. Derby that the eye should be let alone for several days after the extraction was performed, and regarded it as the best procedure except in cases where symptoms developed which warranted the conclusion that something was going wrong. He believed that ether gave advantages which counterbalanced certain possible dangers attending the vomiting liable to follow the administration, such as expulsion of the vitreous, possibly internal hemorrhage. He had not, however, seen those accidents occur. If the ether is rather crowded upon the patient, the chances of vomiting were reduced; but, even with the chances that vomiting will occur, the fixation-forceps, when the eye is insensible, involve no force, and the globe is held in position with ease. On the other hand, if the eye-ball was turned down without anæsthetics, the patient did feel the fixation forceps considerably, and the recti muscles resisted, which he thought increased the danger of expulsion of the vitreous. He always removed the fixation-forceps after the incision was completed, and when the patient was under the influence of ether there was no tendency to turn the eye-ball up, as there was always when the eye was in its normal condition. He had yet to see the disadvantages, and he believed there were positive advantages, from the use of anæsthetics.

DR. W. H. CARMALT, of New Haven, had seen two cases in which death occurred after cataract extraction without ether. In one case death occurred within four hours, and in the other several days afterward. In the latter case there had been diabetes, and for about four years previously the patient—a woman—had been treated for that disease, and apparently had recovered. She had a cataract, and Dr. Carmalt assisted at the operation for its extraction. The tissues of the eye, however, were in such an abnormal condition that the pigment washed off from the iris, so that at the time the incision was made the aqueous fluid was stained almost to the color of India-ink, and there was no attempt at repair on the wound. The patient declined rapidly, and died within four days from the date of the operation.

In the other case the patient was a woman, fifty-five years of age, who had double cataract of the ordinary hard variety, and apparently in good health. She came to his office one day, and wished to be operated upon at once. She denied ever having any illness at all. She wished to take ether, and Dr. Carmalt told her that he would give it to her, but upon examination he found a murmur with each sound of the heart, which was also hypertrophied, and he regarded the cardiac condition such as contraindicated the administration of ether, and, therefore, performed the operation without the aid of an anæsthetic. He questioned the patient with reference to cardiac disease, and she denied positively any knowledge of its existence, and said that she had been able to go upstairs and do ordinary work without affecting her breathing at all. The operation was performed satisfactorily, operating upon the left eye only, and making the lower incision. It was performed at 4 o'clock in the afternoon, and at 8 o'clock of the same evening the patient was dead. The history which he obtained was that she had laid upon the couch not experiencing any trouble, except that she had coughed a little, which upon further investigation seemed to be nothing more than a mere clearing of the throat. She seemed to be feeling well, and talked with her husband concerning the operation, and as he went to his supper he covered her hands with the bedclothes. Returning within half an hour, he found his wife in the same position as when he left her, and supposed that she was asleep, and did not disturb her until about ten minutes afterward, when he attempted to attract her attention, but failed, and he then listened and found that she was not breathing, and was dead. There was no autopsy. Perhaps the ether would have avoided the shock from which she apparently died.

Dr. Norris remarked that the action of ether in many cases of fatty heart was beneficial rather than otherwise. He recalled a case in which he performed an operation for cataract some three years ago. The patient was a lady who was thought to have fatty heart, and it became a question whether or not ether should be given for the operation. Her pulse was feeble before the anæsthetic was begun, but it steadily gained in strength under ether, until it became full and reasonably strong, and no bad symptoms whatever followed this administration, and the patient fully recovered without accident. He had been told by Dr. Hunter, who had administered ether in a large number of cases in Philadelphia, that the heart's action was strengthened by it. As to the risk of death after any operation, it was recognized that kidney disease was a serious complication. Sir James Paget had regarded it as improper to perform any surgical operation upon a patient who had constant albuminuria, and in Turnbull's book on anæsthetics the author had stated that it was a well-recognized fact that anæsthetics should not be given in cases in which kidney disease existed.

The President said that although he had used anæsthetics, both ether and chloroform, freely in a number of cases, he had not yet had

a fatal result. He had used ether where he knew that the patient had kidney disease, and also complications on the side of the heart. He had not been in the habit of examining the urine as a preliminary to operations. He recalled one case with serious complications. It was that of a feeble woman with diseased kidneys and enlarged heart, and much prostrated, who required enucleation. Although the action of the heart became tumultuous and rapid under the influence of ether, the patient did well. It had not fallen to his lot to see a fatal result from the use of anæsthetics. In three instances where chloroform was used he had seen respiration and pulse absolutely suspended, and it required a length of time, which he was unable to estimate, for it seemed so long, to bring back the functions of the lungs.

Now, following operations in old people, there were certain things which occurred not infrequently. Two weeks previously he had performed a cataract extraction upon an old man without anæsthetics, and on the following night—not having had his eyes open except to introduce atropine—he rose from his bed, tore off his bandage, and for twelve days remained in a condition of mild delirium, which Dr. Noyes regarded as due to cerebral anæmia and not to atropine-poisoning.

During last autumn he performed cataract extraction on an old man who was excessively anxious about the operation, and disposed to melancholia. The operation was performed without ether and without an unpleasant result, but the patient had scarcely recovered when his old symptoms returned, and he had since been distressed by continued melancholia. Such liabilities were to be taken into account in forming an opinion as to the influence of any agent upon old people.

He regarded Dr. Norris's first case as decidedly unique. He was not, however, prepared to follow the suggestions made by the author of the paper.

The President then spoke concerning what might be done to avoid the necessity of giving anæsthetics for cataract or other operations in which it might seem desirable to use them.

Priestley Smith, in a book on glaucoma, has suggested that it was well to precede an operation by the free administration of the bromide of potassium, and when the suggestion first came to the President's notice it had already been his custom to give forty grains of the bromide before an operation, sometimes combined with half that quantity of chloral; but since that time he had not only given full doses of the bromide and chloral just preceding the operation, but for two or three days before, so that the patient came to the operation fully under the sedative influence of the drug or drugs. By resorting to that, the occasion, in a percentage of cases, for giving anæsthetics, had been considerably abated.

Again, in those cases in which it had seemed necessary to use anæsthetics for cataract extraction, it had been his practice for several years to give ether—sometimes chloroform—in a way which

furnished the least unpleasant effects. He had very frequently, in selected cases, given only sufficient ether or chloroform to preserve their primary quieting effect, not reducing the patient to a state of muscular relaxation while the incision was being made, and then would allow the patient to recover entirely, so as to obtain the benefit of his consciousness and co-operation for the further steps of the operation. He had found this procedure practicable in a considerable number of cases. Upon the general question, the use of anæsthetics in cataract operation, he had grown to favor the opinion expressed by Dr. Derby. His practice was selective, yet he resorted to them less frequently than formerly. There are certain advantages which are inherent in the absence of chloroform and ether, especially those mentioned by Dr. Derby—the tonicity of the eye to aid in the act of expulsion, etc.; and besides, a point not alluded to by the author of the paper, a patient who was fully under the influence of an anæsthetic was much more likely to have unpleasant hemorrhage in the aqueous chamber, and it was much more difficult to get rid of, because of the absence of *vis a tergo*.

Dr. O. F. Wadsworth, of Boston, had not had any experience in cataract operation without ether. He had performed iridectomy several times without ether, and in one case had had an unpleasant experience. It was that of a man who insisted upon not taking ether, and he appeared to be quite able to bear the operation. The moment, however, the iris was drawn out through the wound, he suddenly rolled the eye strongly upward, twitching away from the forceps, and filling the anterior chamber with blood. A portion was brought away in the forceps, and the entire iris might have been torn out; but, as it was, the result was a tolerably fair one. From his experience in iridectomy without ether, where the patient was obliged to restrain himself for only a short time, it had seemed to him that the performance of cataract extraction without ether would be threatened with bad results in certain cases.

Dr. Wadsworth asked Dr. Derby in how large a proportion of his cases did he find it necessary to give ether; that is to say, in making up the one hundred cases in which the operation was performed without ether, how many did he find in which it was necessary to resort to anæsthetics?

Dr. Derby answered that it was impossible to say. The ether was almost always given at the special request of the patient; but such cases were more and more rare every year. Dr. Derby further remarked upon a point made by Dr. Wadsworth with reference to iridectomy. He did not think that cases of iridectomy were parallel with cataract extraction, because iridectomy was a notoriously painful operation, and it had seemed to him that an eye with a senile cataract was less sensitive than normal, and that an iridectomy could be performed with less pain than in other cases.

The President suggested that the non-sensitiveness might be incident to old age, and not due to the cataract.

Dr. Derby said that possibly such was the case.

DR. J. S. PROUT, of Brooklyn, referred to one case in which, after the corneal section was made, he was obliged to stop and give ether before the extraction could be completed. He also referred to Horner, of Zurich, who had said that he would not operate for cataract with anæsthesia; that if he could not perform the operation without an anæsthetic, he would not perform it.

DR. B. JOY JEFFRIES, of Boston, saw no objection to the use of ether, yet he did not hesitate to operate without it. He had attempted to operate without ether, and had been obliged to stop and administer it, and had not seen any bad results from so doing.

A PECULIAR EXPRESSION OF THE EYES OF THE COLOR-BLIND.

BY B. JOY JEFFRIES, M.D.,

BOSTON, MASS.

PROF. WILSON, of Edinburgh, says in his monograph, published in 1855, p. 152: "I have lastly to notice that there is a singular expression in the eye of certain of the color-blind, which may assist in their detection. It is difficult to describe it, and it is wanting in well-marked cases. But various of the color-blind, whose cases I have described, have presented a peculiarity of look which others have recognized on their attention being drawn to it. In some it amounted to a startled expression, as if they were alarmed; in others to an eager, aimless glance, as if seeking to perceive something, but unable to find it; and in certain others to an almost vacant stare, as if their eyes were fixed upon objects beyond the limit of vision. The expression referred to, which is not at all times equally pronounced, never altogether leaves the eye which it seems to characterize.

"Whether its occurrence in those color-blind persons whom I have examined is but an evidence (which it may be), or the unconscious betrayal of a defective sense, I do not attempt to decide; but I mention the matter here that future observers may keep it in view." Prof. Wilson further says, p. 173: "Since the passage in the close of the Supplement, referring to a peculiar expression in the eyes of certain of the color-blind was written, I have had the opportunity of observing it somewhat particularly in four gentlemen, not relatives, in two of whom it was readily recognized by others. All the parties referred to have healthy eyes, and excellent vision for

everything but color. One has an absent, anxious glance, with something of the expression which amaurosis gives, only the pupil is small. One has a startled, restless look. The other two have an eager, prying, aimless air. The character common to them all, and to the others I have seen, is this aimlessness of look. Macbeth's reference to Banquo's ghost—

> 'Thou hast no speculation in those eyes
> Which thou dost glare with'—

very happily expresses the peculiarity which I find it so difficult to define. It has not, however, in most cases anything repulsive about it. The majority of those I have seen presenting it would be described as having fine eyes. In one the wistful, somewhat melancholy, but pleasing expression of his eye had attracted my attention long before I knew that he was color-blind.

"I do not know whether Dalton or the other famous examples of color-blindness had any such look as I have referred to. This note may lead others to make further inquiry in the matter."

On page 67 of my manual on "Color-blindness: Its Dangers and its Detection," I said: "I can recall something of what Dr. Wilson describes in reference to two or three of my color-blind acquaintances, but, on the contrary, not at all in reference to others. I recognize his difficulty in describing just what it is. I doubt if I should have noticed it, or at least connected it with color-blindness, except for his remarks in reference to it. Had he spoken of such a look or peculiar expression on the part of the color-blind when being examined, I could corroborate it from my experience with both adults and young persons. I have now and then made my diagnosis correctly, from a peculiar, dazed, half-anxious expression of the face and eyes of a looker-on awaiting his turn, as if he was called upon to do something unusual; and sought or expected further explanation than that given the normal-eyed. I do not, of course, mean the natural nervousness of those conscious of some defect; but of those color-blind who had no idea anything was wrong with their chromatic sense, and who often proved difficult to convince. I believe no other observer than Prof. Wilson has remarked on or recorded anything of the kind."

Since writing the above I have seen very many more color-blind, and hence had further opportunity of familiarizing myself with this peculiar look which belongs to them alone, and is not due to any ametropic condition, occurring as it does in the emmetropic. I

awaited some mention of it in the several monographs which have touched on peculiarities connected with color-blindness, but not finding any I called attention to it in a communication before the Boston Society of Natural History at the November 17, 1880, meeting. I would by this brief article draw the especial attention of gentlemen who, officially or otherwise, test for chromatic defect, to this peculiar look, as it cannot but exist among the now many hundred color-blind who have been examined by competent observers, with some of whom the latter must come in frequent contact.

From my later experience I can, however, add but little to Prof. Wilson's description. There is a certain liquid look to the eyes, as if slightly suffused. It gives also the color-blind person the appearance of not listening, or not being interested in what you are saying to them. I have, as I said, detected a color-blind person by this look; but I have also equally failed—being, I suppose, too anxious—to find it before I was sufficiently familiar with it. It has been readily recognized by intelligent bystanders to whom I pointed it out.

A lady once asked me what was the matter with Mr. Blank's eyes. Knowing he was color-blind, I drew her on to describe what she meant, and her account was a very good repetition of Prof. Wilson's, above quoted. She had never heard of this peculiar look of the color-blind. She has since noticed and spoken to me of the same look in reference to some other mutual acquaintances who are color-blind.

I can now recall this peculiar look as connected with the facial expression of a gentleman I knew for many years without detecting his chromatic defect, although the question of color had been entered into between us. His nephews I found color-blind, and they told me of the ridiculous mistakes of their *maternal* uncle. One of these nephews told me only yesterday that he could detect no difference between the brilliant skyrocket lights changing from red to green.

This peculiar expression of the color-blind varies in amount, and even at different times, in the same person. It, however, seems to always hover about the eyes. I cannot answer positively whether it is more apparent in those most defective. I judge that it is.

In speaking before the Natural History Society, last year, I said that I had not noticed it in the few color-blind females whom I had detected. Since then I have found a very color-blind lady in whom it exists to some degree. I probably should not have noticed it, except for my considerable experience with other color-blind.

An anecdote may here help to explain the effect of this peculiar look. During my labors of testing the Boston public scholars I was

one day at a boys' school, when the several classes coming and going in the hall made such a disturbance that the principal stepped on to the edge of the platform to stop it. He said nothing, but merely looked at the lads. To my surprise the noise ceased as soon as he had attracted attention. I thought to myself, as I watched his face, well, that indefinite, aimless expression and gazing into distance won't quell such turbulence. Shortly after I called him to look at the matches a color-blind boy had made with Holmgren's test, in which he saw, as he said, nothing out of the way or to comment on. It then flashed over me that he was color-blind, which, upon examination, proved true. His peculiar look was this of the color-blind. I met him once afterward, coming hastily through a door in the post-office, when I caught his eyes first, and instantly noticed the expression as that of the color-blind, before I recognized the rest of his face.

I have thus briefly called attention to this singular peculiarity, which may prove of value in the detection of color-blindness. I would attempt no explanation of it. Ocular expression is of course due to the muscles of the lids and face. As they, however, are called into play from mental impressions derived through the eye, it does not seem impossible that the color-blind eye may have its own peculiar facial expression.

A CASE OF PERSISTENT HYALOID ARTERY.

(With Chromo-Lithograph.)

BY WILLIAM S. LITTLE, M.D.,

PHILADELPHIA, PA.

WHILE examining with the ophthalmoscope the right eye of a boy, six years of age, who had been sent to me by Dr. Joseph Hearn, of Philadelphia, for the correction of a strabismus convergens affecting the right eye, a persistent hyaloid artery was observed. The boy is small and spare, has been treated successfully for hip disease by Dr. Hearn, and has had the same arm fractured twice.

With the opthalmoscope the optic nerve, without a physiological excavation and with slight pigmentation on its nasal side, is seen with a +4D.

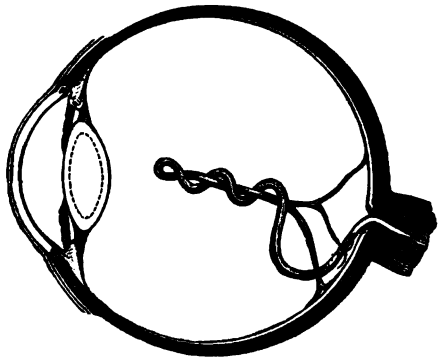
The appearance of the vessels on the face of the nerve is as follows: on the upper and outer quadrant are crowded, very circumflex,

and divide on the disc instead of on the retina as is usual; the artery macularis comes from the depth of the nerve, toward the periphery, near the horizontal diameter of the disc.

On the upper and inner quadrant, the artery nasalis superior is circumflex and divides on the disc; the vein nasalis superior passes directly to the centre of the disc.

The inner and lower quadrant has no medialis vein or artery passing from the centre over it; but branches from the nasalis inferior artery and veins take their place.

The outer and lower quadrant, has the macularis vein upon it; between the two lower quadrants lies one large vein, representing the temporalis inferior and nasalis inferior veins; there is no temporalis inferior artery or nasalis inferior artery on the disc or on the retina, but the vessel to be described takes their place, as will be shown in the description.



The hyaloid artery observed arises about the centre of the disc; on the disc it passes downward, curving slightly toward the nasal side, then curves outward to the edge of the disc; then takes a curve downward, forward, inward, curving gently upward, forward, outward; then sharply downward, forward, inward; sharply upward, forward, outward; sharply downward, forward, inward; sharply upward, forward, outward; then turns directly outward upon itself on a horizontal plane, and passes directly back through the curves made by its progress. These curves number three; two anteriorly surrounding the vessel as it passes backward; the third is about three times as large as the others. When the vessel passes backward under the last curve (posterior one), best seen with a +6D, it bifurcates, sending one branch curving downward toward and on the retina, this becoming the temporalis inferior artery; the second branch at the bifurcation of the artery goes toward the retina on the nasal side, below the horizontal plane, and before it reaches, divides into two branches, one representing the artery medialis on the retina, and the other the nasalis inferior artery.

Dr. J. M. Taylor, of Philadelphia, has made a very accurate

Thos Hunter, Lith. Phila.

sketch of the fundus of the eye, showing the vessel in question and the general distribution of the vessels on the disc and retina; it is a three-quarter outward appearance of the disc and vessel. He has also made a profile picture (diagrammatic) from the nasal side (see page 212). Its shape resembles a cork-screw. The calibre of the vessel corresponds to the other arteries in the nerve and retina. Its color is the same, except where it forms the loop on its extremity, where it is much darker. To see it on the disc a +4D is used; at its bifurcation a +6D; the extreme end is seen with a +9D, and at times a +12D, as it moves toward the extremity; this shows the amount of oscillation.

From its color I believe blood to be passing through it, and in its final distribution the vessels take the place of those that are generally present on the retina, arising from the optic nerve. The position of the vessel, and coming so far forward toward the posterior surface of the crystalline lens, enables it to be called a persistent hyaloid artery; though I have thought at one time it might be a retinal vessel wandering through the hyaloid, the portion going to the crystalline lens having been absorbed.

Heretofore I have seen only one case, of persistent hyaloid artery, and that was rudimentary and bloodless, and seen only close to the disc. Dr. Risley, of Philadelphia, has seen the patient, and I regret that distance has prevented the attendance of the boy.

The left eye presented no abnormality as to the vessels.

I obtained with a +4D for the right eye $\frac{20}{C}$, it being amblyopic. The left eye required a +3D to obtain $\frac{20}{XX}$.

I divided the tendon of the internal rectus of the right eye, correcting the strabismus convergens.

As the boy develops, I desire to watch the condition of the vessel.

The hypermetropia was no doubt the cause of the squint.

AN OPERATION FOR CLOSED PUPIL WITH ANTERIOR SYNECHIA, USING THE *PINCE-CISEAUX* OF WECKER.

By JOHN GREEN, M.D.,

ST. LOUIS, MO.

SINCE the introduction of the *pince-ciseaux* by Dr. de Wecker, I have used it in preference to other instruments in most cases in which I have wished to make a central new pupil in an aphakial eye. At a former meeting of this society I described a special method of iridotomy,[1] in which the instrument had rendered me excellent service—an operation which I have continued to perform in suitable cases, and which has uniformly proved entirely satisfactory in my hands. I have now to report an operation in which I have used the *pince-ciseaux*, first to divide an anterior synechia, and immediately after to extend the opening thus made in the iris, so as to secure a central and nearly circular pupil.

Mary L. W——, seven and a half years of age, was cut in the left eye by a pen-knife, February 6, 1881, the wound involving cornea, iris, and lens. When I first saw her, eleven days after the injury, the cornea showed a nearly horizontal linear cicatrix, about five millimetres in length and a little more than a millimetre below its centre, with the lower pupillary margin engaged in the scar, and the strongly contracted pupil entirely obstructed by the opaque lens. Under atropia the pupil dilated only at a single point, and very slightly. The eye recovered without further accident, but with a practically occluded pupil and with a shallow anterior chamber, due to the fact that the iris was drawn forward toward the point at which it was attached to the cornea.

June 16th, about four months and a half after the date of the injury, and after all traces of irritation had disappeared, the anterior chamber was opened by means of a Graefe cataract-knife, in a

[1] Trans. Am. Ophth. Society, 1875; Wecker's Chirurgie Oculaire, pp. 123–125. Paris, 1879.

horizontal line midway between the cicatrix of the original wound and the lower corneal margin. The *pince-ciseaux* was then introduced, and the anterior synechia snipped through close to Descemet's membrane. Lastly, one blade of the *pince-ciseaux* was passed through the button-hole thus made in the iris, and the iris, lens-capsule, and any newly formed tissues, were divided by a single closure of the instrument, in a line about four millimetres long and crossing the old pupil.

The immediate effect of the operation was the formation of a clear central pupil and a conspicuous deepening of the anterior chamber. With the exception of a small clot, which partially filled the new pupil, there was no bleeding. Healing was rapid and without complication.

At the date of this writing, one month after the operation, the eye is perfectly free from irritation, the anterior chamber is of good depth, and the new pupil is small, central, and of nearly normal appearance. Careful examination reveals a thin film behind the pupil, which it may probably be well to divide by a needle operation at some future day. With a correcting-glass of 12 d. V. $=\frac{xx}{xx}$ Snellen.[1]

The conditions which determined the operation in this case are very frequently met with as sequelæ of complicated wounds of the cornea. The *pince-ciseaux* offers the great advantage that it enables us to make a free division of a very dense and tough membrane within the eye, while its use is attended with little or no traction upon the iris or other tissues.

[1] December 9, 1881, nearly six months after the operation, V. measures $\frac{xx}{xx}$.

CONGENITAL PARALYSIS OF BOTH ABDUCENS AND BOTH FACIAL NERVES.

By G. C. HARLAN, M.D.,

PHILADELPHIA, PA.

A YOUNG man, eighteen years of age, a cooper by trade, well developed and in excellent health, came to the Wills Hospital on account of defective vision and deformity of the eyes. The condition was noticed soon after his birth, and has not altered since. He has been able, with some difficulty, to get a common school education and to learn his trade, at which he is now working.

There is complete paralysis of the sixth and seventh nerves on both sides. The eyes are turned strongly inwards, with no trace of any power of external rotation, though the function of all the orbital muscles but the abducent seems normal.

The orbicularis is entirely powerless. When the patient is told to shut his eyes, they roll upward so as to conceal the cornea beneath the upper lids. There is a slight upward tendency of the axes when the eyes are at rest. The surface of the cornea—particularly of the right—is just perceptibly dulled, though the defect in vision seems to be due principally to epiphora, which is very marked, as the puncta do not touch the balls. Vision is O. D. $\frac{20}{120}$ and O. S. $\frac{20}{C}$; not improved by glasses. Ophthalmoscopic examination, on account of the position of the eyes, the slight haziness of cornea and the epiphora, is extremely unsatisfactory, but the fundus seems normal. He uses the left eye by preference for near vision, but can use either. Fixation is with the macula in each eye. In endeavoring to make out the test-letters at 20', he accommodates the position of his head to the eye in use, but ordinarily there is no such movement of the head. In walking the head is held quite straight, and he probably uses the right eye for objects on the left side, and the left for objects on the right. He has never had diplopia. The epiphora was considerably relieved by slitting up the canaliculi and cutting out the inner lips of the wounds, but the patient failed to present himself at the hospital for some weeks, and the canals partially closed. I have

thought of endeavoring to give a better position to the eyes by dividing the internal recti freely and removing a fold of the conjunctiva and subconjunctival tissue over the outer side of the balls.

The immobility of this man's face is very striking; it is as smooth and expressionless as if carved out of wood. The passions and emotions of eighteen years have left no trace upon it, and time has changed only its size. A photograph taken recently might almost pass for an enlarged copy of one that was taken in early childhood. I was at first somewhat puzzled by a slight downward movement of the corners of the mouth, but discovered that it was accomplished by the platysma. There is no paralysis or impairment of any other nerve than the sixth and seventh. Hearing is good and speech is affected only by absence of motion of the lips. There is no serious inconvenience in mastication, and no overflow of saliva. I can detect nothing unusual in the muscles of the palate, and am satisfied that there is no impairment of taste or sensation in the tongue. The complete activity of the sense of taste was confirmed by Dr. Chas. K. Mills, who made a careful examination in regard to this point.

The eye-symptoms in this case—extreme internal strabismus, lagophthalmos, and epiphora—offer nothing worthy of special remark, except the rarity of their congenital cause, and are interesting only as a curiosity. There are, however, several considerations of interest in connection with disputed points, as to the origin and distribution of the nerves involved. The complete congenital paralysis of these two nerves, widely separated in their course after they leave the brain, points to a central cause, and supports the view that they arise from the same nucleus. Cruveilhier says: "It is easier to trace the origin of the sixth pair in the mammiferous animals than in man. In the former Gall has followed the roots of the sixth pair to the sides of the pyramids; Herbert Mayo makes them traverse the protuberance to reach the posterior part of the medulla oblongata. Stilling has followed the nerve through the protuberance to the floor of the fourth ventricle, where he makes it terminate in a nucleus of gray substance, in common with the facial. But, according to Schroeder van der Kolk, the fibres of the oculo-motor curve outward, and simply traverse the nucleus of the facial, and reach the superior surface of the bulb, to terminate probably in a distant nucleus." I believe it is now generally agreed that the deep origin of both the sixth and seventh nerves is somewhere in the floor of the fourth ventricle.

Perhaps no other nerve has received a larger share of discussion

than the tympanic branch of the seventh, or is at present the subject of a greater diversity of opinions as to its origin, distribution, and function. Recent positive observations upon the effects of division and irritation of this nerve in the tympanum would seem to leave little doubt that it supplies nervous filaments of taste, and perhaps of sensation to the tip of the tongue. Its effect upon the salivary secretion offers a still wider field of discussion, which it would be out of place to enter upon here. Oscar Wolf, in a paper "On the Function of the Chorda Tympani," in a recent number of the *Archives of Otology* (vol. ix., No. 4), states that the part of the tongue paralyzed by accidental section of the nerve in the tympanum (paralyzed both in taste and sensation) "formed a right-angled triangle, whose hypothenuse was formed by the edge of the tongue, and whose longest side was 2 ctm. in length;" but admits that the *origin* of the nerve-fibres supplying this portion of the tongue is still an unsolved problem. The preservation of taste with complete paralysis of the facial indicates that the deep origin of the chorda tympani is not the same as that of the facial. Supposing the filaments of taste and sensation to be derived from the fifth, or from the nerve of Wrisberg, the absence of any symptom of disturbance of these filaments confirms the supposition that the cause of the paralysis in this case is central, and dependent upon defective development, or intra-uterine disease, of a small spot in the fourth ventricle.

The symmetrical character of the lesion makes it more curious, but at the same time less useful to the physiologist, as it prevents it from throwing any light upon the important and vexed question of the decussation of the fibres of the seventh nerve.

THE TREATMENT OF SCARS OF THE FACE INVOLVING THE EYELIDS, DIRECTLY OR INDIRECTLY.

By CHARLES STEDMAN BULL, M.D.,

NEW YORK.

Scars upon the face, in the vicinity of or directly involving the eye-lids, have long been a subject of interest to ophthalmic surgeons, and various have been the attempts to remedy the defects produced by the contraction subsequently occurring in them. The main interest has apparently centred in those scars, more or less extensive, due to burns or to extensive laceration and destruction of soft parts from wounds, chiefly gunshot, like those received in battle. The same or an equal degree of interest does not seem to have been attached to those depressed scars due to long-continued glandular abscesses, or to chronic bone disease with subsequent exfoliation of bone. The object to be gained by operative interference in these cases is two-fold, viz., to remedy an unpleasant deformity, and to protect the eye from injury by restoration of one or both eyelids, in whole or in part. Whether the case be one of partial or complete ectropium of one or both lids, caused by the cicatrization following a burn, or of partial or complete destruction of one or both lids, the operation deemed necessary is some form of blepharoplasty, either by sliding flaps or the transplantation of a flap with pedicle from some neighboring region, or by the process of grafting without pedicle by the transplantation of skin in numerous small pieces or in one large graft, from some distant region. All of these various operations occasionally fail in their ultimate results, and this from no fault in their technical performance. No surgeon, however experienced, in his desire to correct a deformity, can ever trust implicitly in the persistence of a large scar; and we should be very cautious in attempting to remove the effects of contracting bands of tissue by operation, for every new incision that is made is eventually filled up by the formation of this same granulation tissue, in which the same contracting process goes on as in the original scar. The new-formed granulation tissue is gradually changed into

fibrous connective tissue, and then becomes true cicatricial tissue, made up of bundles of connective-tissue fibres, as are seen in tendons and fibrous membranes. This conversion of the exudation cells of granulation tissue into filaments of cicatricial tissue ending in contraction seems to be very much of a mechanical process. We all recognize the fact that the changes taking place in a cicatrix do not cease with its formation, for the gradual contraction continues for a considerable, though very variable, period of time, and does not attain its maximum until long after the completion of the cicatrization. In view of these facts, it has seemed to the writer that operations for blepharoplasty are sometimes undertaken too early, before cicatricial contraction has ceased, and that, in some of the cases at least, the lack of ultimate success may be thus explained. Another point to be remembered is that the contraction in scars from burns is greater than from any other cause, and the contracting process lasts longer. Still another point to be remembered is that the degree of contraction, though largely dependent on the nature of the agent that caused it and upon the extent of its destructive action, also depends somewhat upon the seat of the scar. If it is in a region where the skin is naturally tense, as over bony prominences, the contraction will be slighter than where the skin is naturally loose. A scar over the superior orbital margin, or on the side of the nose, or over the zygoma, will contract less than one over the lower orbital margin or on the cheek. But, on the other hand, in injuries or burns of those regions where the skin is naturally tense, the resulting cicatrix is in most cases immovable, in this regard being almost characteristic. In superficial caries with an external opening, when the bone disease is arrested and the necrosed portions have been detached and cast off, repair goes on in the usual way by the formation of granulation tissue, which is subsequently converted into fibrous tissue, becomes continuous with bone or periosteum, contracts and possibly ossifies, and thus the depressed cicatrix is caused. This is well described by D. Hayes Agnew in his last work on Surgery.

We should not be too hasty in operating for deformities about the lids produced by the scars resulting from bone disease, for very often these scars break down from pressure or tension, or from some constitutional cause, such as struma, or scurvy, or alcoholism. Such spurious cicatrization is not infrequently seen over fistulous openings from bone-caries; the surface of the scar retains a pale blue hue, sometimes for a long period, and conceals a granulating tissue below. Such scars never attain the vitality of older structures, and

the larger they are the less vitality, as a rule, do they possess. Any operative procedure to relieve the deformity accompanying such a scar would be almost certain to fail, whether by blepharoplasty with sliding flaps or with a pedicle, or by grafting without a pedicle. Excision of the entire scar, and, if bone disease be present, removal of the affected portion by forceps and scraper or chisel, must precede any successful attempt at blepharoplasty, if a solid cicatrization is to be obtained.

Certain observations of the writer upon the natural course of development and transformation in scars of the face, involving the lids directly or indirectly, have led him to think that the natural process of change may be assisted and perhaps hastened by a combination of massage and traction, and thus the parts made more movable and put into a better condition for the performance of any blepharoplastic operation, the chances of the success of which are thereby enhanced. We know that in time the tissue of a scar assimilates more and more to the structure of a part, and its deep attachments become more movable. The scar which at first is thin, bluish, and shining, and composed of undeveloped fibrous tissue, becomes white and depressed, and its structure comes very slowly to resemble that of the part where it is situated, though of course it never becomes true skin. The loosening of such scars from their deep attachments is due to a slow absorption of certain tissue-elements and the formation of a loose net-work of connective tissue, more or less elastic and pliable, at the base of the scar. Great changes occur in this regard in course of time; but, as Hayes Agnew says, external agents, such as rubbing and kneading the parts, or massage, and even soaking and steaming the parts, are useful in hastening the process of interstitial absorption. We can readily see that the act of massage, by pressure on plastic deposits, causes an absorption of a certain amount of intercellular material, and thus the texture at the base becomes more open. Persistent rubbing and kneading of scars of the face, both those due to burns and those resulting from bone-caries, as preparatory to blepharoplasty, have, in a number of instances in the writer's experience, yielded most excellent results. Adhesions of scars, slight or extensive, to the subjacent parts, have been slowly, cautiously and painlessly detached, and a gradual absorption of the firm material in the dense part of the scar has been brought about. So considerable has been the result obtained in some cases that the writer has come to regard this gradual extension and loosening as an important part of the treatment in these

cases. It is astonishing how soft and pliable the seams in these scars become under this treatment, and this pliability and elongation of the cicatrix is probably permanent. The depressed scars due to bone disease, in which, after the casting off of the sequestrum, the fistulous sinus has closed and the scar has become depressed and firmly adherent to the bone or periosteum, generally prove intractable to this method of treatment by massage. In these cases it will be necessary to divide the adhesions subcutaneously, and then keep up motion in the parts by rubbing, until all danger of re-adhesion of the old attachments has passed. This operation has been advocated by Mr. Wm. Adams, of England, who has practised it in a number of cases with success. (See *British Medical Journal*, April 29, 1876). He describes it as an operation for the obliteration of depressed scars after glandular abscesses or exfoliation of bone. The operation consists, first, in subcutaneously dividing all the deep adhesions of the cicatrix by a tenotomy-knife, introduced in healthy tissue, a little beyond the margin of the cicatrix, and carried down to its base. Then the depressed cicatrix is carefully and thoroughly elevated, lifting it up as it were so that the cicatricial tissue remains prominently raised, and the cicatrix maintained in its elevated position for several days by passing two hare-lip pins or needles through the base at right angles to each other. The needles or pins are generally removed on the fourth day, and the cicatricial tissue, somewhat swollen and infiltrated, is allowed gradually to subside to the proper level of the surrounding skin. Adams thought that after subcutaneously dividing all the deep adhesions of the cicatrix, elevating the cicatricial tissue, and retaining it so raised for a few days, the depression would become filled up by inflammatory infiltration, so that the scar could not again sink below the level of the surrounding skin; the depression would thus become obliterated, and all the adhesions of the cicatrix would be effectually removed. The doubtful point is whether, in the course of time, absorption and re-contraction of the inflammatory lymph would take place, so that the depression would return.

After the operation the cicatricial tissue always loses its shiny, membranous character, and becomes looser and of an opaque white color.

So far this method of treatment of depressed, adherent scars from bone-caries has been employed by the writer in but three cases, but in all with satisfactory success. One was for complete eversion of the lower lid by a broad, depressed cicatrix, firmly adherent to the

superior maxilla below the orbital margin. The original trouble was probably extensive caries of the bone from scrofulous disease. After the loosening of the scar had been done, and subsequent massage treatment had been carried on for four weeks, the lid was inverted, and the space opened by the incision was filled in the ordinary way by transplantation of a flap of skin with pedicle from the temple.

The second case was also complete eversion of the lower lid from the same cause, the original injury having been a pistol-shot wound. The adhesions here were not so broad as in the first case. The subsequent method of treatment was the same.

The third case was one of almost complete eversion of the upper lid, produced by a long and somewhat broad scar on the forehead, just above the eyebrow, the cicatrix being markedly depressed and firmly adherent, throughout its whole length, to the bone. There had been quite extensive destruction of bone from a severe blow received many years before. In this case also the same steps were carried out, and the resulting gap filled by transplantation of a flap from high up on the forehead. As before stated, the ultimate result was excellent in all the cases.

A SOURCE OF DANGER IN THE FRAME OF THE EYE-GLASS AS COMMONLY MANUFACTURED.

BY F. B. LORING, M.D.,
WASHINGTON, D. C.

THE two following cases are not remarkable in themselves, nor can they claim any special interest beyond the peculiar manner in which the injury was inflicted, and the fact that, as long as eye-glasses are manufactured on the present system, the ametropic community will be liable to similar accidents of a greater or lesser degree. Some months since, M. L——, a student, consulted me in regard to an injury of the right eye, received during a frolic with some companions, from the blow of a hard pillow on the corresponding side of the head. The glass had been driven against the eye, and the small, acorn-pointed spike that is always placed by the maker on the *inner* side of the handle of the frame, as a means of locking the glasses together when closed, had penetrated the conjunctiva and subconjunctival tissue, and, driven by the lateral force of the blow

in a direction upward and inward, had inflicted a rent of about two-thirds of an inch in length. This had been treated by a poultice and the application of tea-leaves, and an attack of purulent conjunctivitis had resulted. This was quickly subdued, and the wound healed rapidly under washes of boracic acid and rose-water. In the second case, M. F——, a teacher of sparring, received, during a glove-fight, a "cross-counter" over the right arm, which knocked him completely down, and again drove this small spike into the tissues of the eye, to such a depth that his attendant stated that it required some effort to disengage it, the bulbous point having apparently acted as a barb. The gloves that were used in the encounter were those that are technically known as "hard," and were practically useless as a means of protection against injury. The eye and surrounding tissues were in a state of intense congestion and inflammation at the time of my first examination, some ten days after the injury was received. The conjuctiva was congested and chemotic, and in the lower part distended with effused blood. The cornea was clear and transparent. The iris was discolored and contracted to a pin's point, and the pupil completely plugged with lymph, adhesions having formed round its entire circumference. At a point about four lines outward from the lower edge of the cornea there was a small, jagged perforation, the mouth of which was slightly elevated and filled with a plug of yellow pus. The tension of the eye was greatly diminished, but, owing to the occlusion of the pupil, no ophthalmoscopic examination was possible. V. was entirely wanting. Under treatment the pain and inflammation were subdued and the wound closed; the globe, however, gradually contracted, phthisis bulbi ensued, and the patient was discharged with no perception of light in the injured eye. As has been shown, the injury in both these cases was the direct result of having the catch placed on the inner side of the frame, and I have been in the habit latterly of having it entirely removed in those cases where the patient wears his glasses constantly, and in all others of having it put on the *outer* side of the frame, a corresponding twist, if necessary, being given to the spring.

Another interesting point, particularly in the latter case, might be found as an argument against the statement lately made abroad, that the use of glasses renders the wearer timid, and diminishes the taste for athletic sports. In this case we have a man who deliberately enters the prize ring with his glasses on, and during the past year I have seen a conjurer who juggled with heavy knives with a semi-

corrected myopia of $\frac{1}{3}$, and an astigmatic ball-player, who habitually caught behind the bat in his glasses, the only protection to his face being a band to guard his teeth; and I have no doubt that many gentlemen here have similar cases in their note-books.

REPORT OF A CASE IN WHICH USEFUL VISION WAS MAINTAINED THROUGH A NUMBER OF YEARS BY THE AID OF A TOTALLY DISLOCATED LENS.

BY SAMUEL THEOBALD, M.D.,

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THE following remarkable case, of useful vision maintained through a number of years by the aid of a totally dislocated lens, is believed to be unique:

J. B. K——, a delicate-looking lad, twelve years old, of German parentage, was brought to me by his father in December last, for advice regarding his sight, which had been defective from infancy. Upon examination the eyes were found to be slightly hyperæmic, the anterior chambers abnormally deep, the irides tremulous, and the pupil of the right eye to occupy an eccentric position very near the upper margin of the cornea, the tension of each being somewhat below normal. Of course, absence or dislocation of the lenses at once suggested itself, and upon resorting to the ophthalmoscope I discovered without difficulty in the left eye that the lens was dislocated directly downward, that it was lying some distance below the pupil, was freely movable, and was not cataractous. Owing to the eccentric position of the pupil in the other eye, a satisfactory examination could not be made until atropia had been instilled, when exactly the same condition as in the left eye was found. Nothing else abnormal was discovered, except about each disc a myopic crescent, and a general thinning of choroidal pigment.

After making this discovery I was somewhat surprised to learn that, although the boy had never worn glasses, he had attended school regularly, and had not only been able to study his lessons satisfactorily, but had been much given to reading for pleasure—in fact, was quite a book-worm. Handing him Jaeger's test-types, I requested him to read the smallest letters which he could distinguish, whereupon he bent his head well forward, with his face toward the floor, placed the type within one and one-fourth inch of his left eye,

and read off No. 1 with perfect fluency. When directed to read with his head erect, he could scarcely make out with this eye No. 17. There was but one explanation of this phenomenon: by the forward movement of his head the lenses were thrown into position behind the pupils (or, at least, this was what took place in the left eye), and by this means he obtained a distinct retinal image. At a subsequent examination I satisfied myself that this was what occurred, by watching the lens with the ophthalmoscope as it glided into position. His father informed me that he had always read in this manner, and that from his earliest childhood he had been in the habit of using his eyes in this peculiar fashion. With the right eye (before instillation of atropia) he could with head erect distinguish with difficulty J. No. 11, but by inclining his head could do no better. His distant vision, which was next tested, gave the following result: each eye sees $\frac{20}{CC}$; L. with + $\frac{1}{4}$ V. = $\frac{20}{LXX}$; R. with + $\frac{1}{2\frac{1}{4}}$ V. = $\frac{20}{LXX}$. No further improvement in the vision of the right eye could be obtained from the addition of a stenopæic apparatus. The test with convex glasses for near vision not being very satisfactory at his first visit, glasses for distance were prescribed (L. + $\frac{1}{4}$ s.; R. + $\frac{1}{2\frac{1}{4}}$ s.), and he was told to report in a few days. In eleven days he returned, having in the meantime worn his glasses with much satisfaction. His vision with them had improved slightly: L. V. = $\frac{20}{LXX}$ and two letters $\frac{20}{L}$; R. V. = $\frac{20}{CC}$. As a result of various trials with reading-glasses, I finally selected for the left eye + $3\frac{1}{2}$ s., with which he could read J. No. 4 at about 6″; and for the right eye I prescribed a plain glass, thinking that, as it had not previously taken part in near vision, it would be safer not to induce it to do so now, and especially since its vision was much below that of the other eye. The left eye, even with + $\frac{1}{2}$, could not decipher J. No. 1, although with the dislocated lens, as I have said, it could read it with facility.

Observing how very close the type was held to the left eye when being read through the dislocated lens, it occurred to me to test the action of concave glasses upon the sight while the lens was kept behind the pupil by the inclination of the head, and in this way one of the most interesting points of the case—*the extreme convexity of the displaced lens*—was brought out. Passing from weaker to stronger glasses, I finally found, to my surprise, that with − $\frac{1}{4}$ s. the left eye could still read J. No. 1 with ease; that with − $\frac{1}{2}$ s. it could make out some words of No. 1, and could read No. 2, the page being held a little less than 2″ from the eye; and that even with two − $\frac{1}{2}$ s. glasses combined it could read No. 4 at 3″. I next placed Snellen's types

upon the floor, and the patient, standing over them with his head forward, the letters being 4′ from his eye, made out several letters of No. XXX. through two $-\frac{1}{8}$ s. glasses combined with $-\frac{1}{6}$ s., that is, practically, through a lens of $\frac{8}{7}''$ negative focus. By these tests, therefore, it was shown that with the lens in position, a M. of at least $\frac{1}{13\frac{1}{4}}$ existed. Now, as this eye, with the lens below the line of vision, required for distant sight only a $+\frac{1}{7}$ glass, it evidently was myopically elongated; but, admitting that it would have needed $+\frac{1}{8}$ if emmetropically formed, we could account in this way (allowing half an inch for the distance between the glass and the nodal point of the eye) for M. of scarcely $\frac{1}{4}(\frac{1}{4\frac{1}{16}})$—less than one-third of what, with the lens in position, was manifest. Evidently, then, this extreme degree of M. was due to unusual convexity of the dislocated lens; indeed, the focal length of the latter must have been not only much shorter than the focal length of the *unaccommodated* lens of the diagrammatic eye of Helmholtz, but somewhat less even than that given by him for the *accommodated* lens. Since it converted H. $\frac{1}{6\frac{1}{2}}$ into M. $\frac{1}{13\frac{1}{4}}$, its focal length (assuming that its position, as regards distance from the retina, was as favorable as if it had been normally suspended behind the iris, which probably was not the case, as it did not press the iris forward enough to appreciably lessen the unusual depth of the anterior chamber) must have been but little more than $1\frac{1}{8}''$ (Paris), or more exactly $1.2293+''=33.269+$ mm.; whereas, in the diagrammatic eye, the focal length of the unaccommodated lens is 43.707 mm., nearly $1\frac{2}{3}''$ (Paris), and of the accommodated lens, 33.785 mm., very nearly $1\frac{1}{4}''$ (Paris). We would scarcely be justified in assuming that the lens in this instance was equivalent to a normal lens *just liberated from the restraining influence of its ciliary attachments*, nevertheless, the extreme convexity which it exhibited is significant, and seems to me to afford additional evidence in favor of the now generally accepted, though as yet not proven, theory of accommodation propounded by Helmholtz.

I have only to add, in completion of the history of this case, that upon re-examination in May, after the glasses prescribed had been worn nearly six months, I found that the eyes were less hyperæmic, and that the vision of each had improved somewhat: L. with $+\frac{1}{7}$ V. $=\frac{20}{L}$ except S; R. with $+\frac{1}{3\frac{1}{4}}$, V. $=\frac{20}{CC}$, and C of $\frac{8}{C}$; and with his reading-glass ($+\frac{1}{3\frac{1}{4}}$) the L. could now make out J. No. 1. He also proved to me that he had not lost the faculty of using his dislocated lens, by reading J. No. 1 with it as fluently as he had done before.

REMARKS.

DR. GEORGE C. HARLAN, of Philadelphia, referred to a case of total dislocation of the lens with far vision. The patient was hysterical, the eye became irritable, seemed to be a source of irritation, photophobia supervened, and finally it became necessary to extract the lenses from both eyes. The lenses were entirely transparent. The dislocated lens was always in front of the pupil, there was no attachment whatever, and the lens was entirely free.

DR. H. W. WILLIAMS, of Boston, referred to a case in which the eye had been struck with a piece of wood, and the lens was so dislocated that it hung merely by a hinge-like portion at the lower part. When the patient lifted his head the lens tipped backward, and when he stooped forward he saw distinctly, and without it he saw with a cataract-glass. As there was good vision with either eye, he thought it was unnecessary to interfere at all with the injured eye.

THE COMPARATIVE VALUE OF THE MYDRIATICS.

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UNTIL a comparatively recent date, sole reliance was placed upon the solutions of sulphate of atropine where a mydriatic was desired in ophthalmic practice, whether for the treatment of inflammations of the eye or for paralyzing the accommodative function. For either of these purposes it was found very useful and efficient; but the many days required to dissipate its influence, even after the instillation of a single drop of a four-grain solution, made it extremely desirable that some agent should be secured which would possess in a satisfactory degree the sedative and paralyzing properties of the atropine, but would also rapidly resign its control over the accommodation.

Recent investigation has furnished such agents, and experience in their employment has seemed to demonstrate their usefulness in correcting errors of refraction; and they now bid fair to replace the old mydriatic. In the treatment of inflammations also, they seem quite as efficacious as atropine; but extended observation in this direction is still wanting.

The investigations of Dr. William F. Norris and others with sul-

phate of duboisine have thrown much light upon the value of that drug. My own studies of its value have been already published in the *American Journal of Medical Sciences* for April, 1880; and the same, with additional cases and a tabular statement of the whole, in the *Louisville Medical Herald* for August, 1880. Similar investigations with the hydrobromate of homatropine and the sulphate of hyoscyamine have also been brought forward, the former in the *American Journal of the Medical Sciences* for January, 1881; the latter in the *Philadelphia Medical Times* for February 26th of the same year.

The publication on the sulphate of duboisine was based upon one hundred and forty cases, and seemed to justify a series of conclusions which are here reproduced: "1st, that in solutions not stronger than two grains to the ounce the sulphate of duboisine is free from danger; 2d, the two-grain solution of the sulphate of duboisine paralyzes the accommodation more rapidly than a four-grain solution of sulphate of atropine; 3d, that the duration of its effect is less than half that of the sulphate of atropine; 4th, that the preparations now in the market are more liable to irritate the conjunctiva than neutral solutions of sulphate of atropine; 5th, that in the treatment of inflammations of the eye duboisine may be used as a substitute for atropine."

The conclusions reached from the use of hydrobromate of homatropine in *thirty-seven cases* were formulated as follows: "1st, that hydrobromate of homatropine, in solutions of two, four, and six grains to the ounce, is competent to paralyze the accommodation; 2d, that in from sixteen to thirty hours the paralysis entirely disappears; 3d, that it is no more liable to produce conjunctival irritation than the salts of atropine or duboisine; 4th, that it produces far less constitutional disturbance than either the atropine or duboisine."

The paper on the sulphate of hyoscyamine was a preliminary statement containing the results obtained from a careful record of its use in eight cases. No conclusions were formulated upon so limited an experience, but the results were so encouraging that its employment has been continued. The observations made upon its use in the first eight cases, published in the *Medical Times*, are thoroughly in accord with the later experience.

The object of the present paper is to give the results of additional experience in the use of these drugs, and to sum up and place on record in the annals of this society, what has seemed to be their

comparative value as employed for the purpose of determining and correcting errors of refraction.

The investigations in the use of homatropine have been extended, and a total of about one hundred and thirty cases reached. Of these, in one hundred and eleven cases careful records of the length of use, the duration of the paralysis and the full history of its action, have been kept. These results only confirm and emphasize those before reached, and call for no modification in the conclusions already given. For some months past the sulphate of hyoscyamine has been used in the majority of private cases requiring a mydriatic, and the number is now considerably over one hundred. Ninety of these have been carefully studied, and upon them the following remarks are based. In eight of these cases an accurate daily record was made of the returning range of accommodation, in order to ascertain the exact time of its full recovery. In twelve other cases the date of the full return of the accommodative function was noted, but the same care was not exercised to determine the *earliest* time of its re-establishment. Upon these twenty cases the average time required for its return has been estimated, with the result given in Table I.

The conclusions which have seemed to be justified by its use in these ninety cases have been confirmed by its further use, and may be stated as follows:

First.—That the sulphate of hyoscyamine in a solution of gr. ij. to fl. ʒ j. is competent to quickly paralyze the accommodation.

Second.—That it does not cause more conjunctival irritation than solutions of the sulphate of atropine.

Third.—That the duration of its influence over the accommodation is less than half that of atropine.

Fourth.—That it causes less constitutional disturbance than a corresponding solution of the sulphate of duboisine.

The further use of sulphate of duboisine has only served to confirm the conclusions already published and given above.

The long experience which has been had in the use of the sulphate of atropine, and the numerous observations which have been made as to its physiological action, have placed its merits upon quite a certain footing, and made its properties the natural standard of comparison. Thus, it is well known that, after the instillation of a four-grain solution of sulphate of atropine, the near point recedes to coincide with the far point of distinct vision. This result, however, has been shown by experience not to follow always upon the single

instillation, so that it has been found necessary in practice to continue the use of the solution, instilling it three times daily, for some time, before all range of accommodation has entirely disappeared. The method for determining whether this result has been attained is by the addition of a convex lens, *e.g.* $+\frac{1}{12}$, to the correcting-glass. If then the paralysis be complete—if *p.p.* = *p.r.*, Jaeger No. I. can be read at twelve inches, the focus of the lens, but theoretically no nearer nor farther, due allowance being of course made for the distance of the convex glass from the nodal point of the eye. Many persons, however, are still able, after prolonged use of atropine, to read Jaeger No. 1, under the above conditions, from eleven to twelve and one-half inches, for the reason that an absolutely clear image is not necessary in order to read Jaeger No. 1. When the remaining range is no greater than one or one and one-half inches, the paralysis may be considered complete. It has been with this standard, therefore, and by these methods, that the newer mydriatics have been compared in investigating their power over the function of accommodation.

In cases of asthenopia from eye-strain consequent upon some defect in the refraction of the eye, the paralysis of the accommodation is not the only thing to be accomplished by the use of a mydriatic; or rather, the success of a mydriatic in the treatment of asthenopia depends largely upon another of its properties. These eyes almost invariably present retino-choroidal irritation, often to a marked degree, and the undue sensitiveness to light, etc., must be removed before the accommodation will become sufficiently quiet to permit the accurate determination of the correcting-glass. Just as in some inflammatory diseases, notably phlyctenular keratitis, full dilatation of the pupil can be gained, if at all, only by very frequent instillations of the mydriatic, on account of the great irritability of the iris, so in these cases the ciliary muscle, in spite of the full use of the atropine, may be awakened to activity by the effort at correction. It has therefore been necessary to continue the mydriatic in such cases until the irritation and the symptoms depending upon it have disappeared. So, in comparing these drugs, not only their power over the ciliary muscle of the healthy eye should be determined, but also the extent to which each possesses the equally important property of allaying the irritability of the weak asthenopic eye. Under the use of atropine I have constantly seen the asthenopic symptoms subside, at the same time that the attending undue capillarity of the nerve-surface, the haziness of the retina, and the woolliness of the

choroid would disappear, and that ordinarily in a few days. Therefore, in the study of the newer mydriatics the very important question has been presented, whether, even if they were found capable of paralyzing the accommodation, they would act equally well in this respect.

The following table and those on pages 235 and 244–254, will serve to demonstrate the comparative value of the drugs in these two important particulars, and thus furnish positive indications of their relative utility in the daily routine of practice. For, since the glasses have been ordered only after the subsidence of the irritability of the eyes and the complete paralysis of the accommodative power, it follows that the length of time for which it was found necessary to use the different mydriatics, in considerable series of cases, would furnish a very satisfactory indication of the comparative value of each.

TABLE I.

Length of time used.	Atropine.	Duboisine.	Hyoscyamine.	Homatropine.
6 hours or less...	0	No record.	..	28
8 " " ...	..	"	6	..
12 " " ...	1	"	..	..
1 day or less....	1	"	8	30
2 days or less...	9	23	24	26
3 " " ...	10	28	23	13
4 " " ...	7	11	15	6
5 " " ...	6	10	7	3
6 " " ...	6	4	1	..
7 " " ...	4	2	2	3
8 " " ...	1	..	1	1
9 " " ...	2	..	..	..
10 " " ...	..	..	..	1
11 " " ...	..	1	..	..
13 " " ...	1	..	..	..
14 " " ...	2	1	..	..
16 "	..	..	1	..
28 "	..	1	..	..
Total cases.....	50	81	88	111
Average time...	5¼ days.	3¼ days.	Less than 3 days.	31 hours.

Table I. has been constructed in this view : in it the atropine column is made up of fifty cases taken consecutively from the case-book, all of which were treated under atropine immediately before my observations with duboisine were begun. Accurate record was made of the length of use in 81 of the duboisine cases, in 88 of hyoscyamine, and in 111 where homatropine was employed.

It will be seen that, in point of time required for treatment, atropine is at a great disadvantage as compared with the newer drugs, since it required an average time of five and one-fourth days before the glasses were ordered, as against three and one-fourth days for duboisine, less than three days for hyoscyamine, and only thirty-one hours for homatropine. It is but fair to state, however, that the average time, as set forth in this table, in the case of atropine, is too high for healthy eyes or for those presenting but slight irritability. For, if we exclude from the table the cases in which the use of the drops was prolonged for many days, because of the severity of the choroido-retinal disturbance, and make due allowance for cases living out of the city, where an earlier visit would have shortened the period of use, it will be seen that the average time, in comparatively healthy eyes, will fall below that given in the table. Again, in case of homatropine, some modification should be made ; for in twenty-eight of the one hundred and eleven cases it was employed for six hours or less, to be immediately followed, in many cases, by one of the other mydriatics, usually atropine or duboisine, in order to verify the results reached under the homatropine. These cases occurred before complete confidence in its efficiency had been gained. Making these allowances, the result is that atropine was employed for an average of 4 days, duboisine for 3.4, hyoscyamine for 3, and homatropine for 1.8.

A further study of the tabular statement serves still further to demonstrate the superiority of either of the new mydriatics in this respect. Thus, in the atropine column it is shown that in only twenty-two per cent. of the cases were the drops stopped inside of *three* days. Under duboisine, however, three days have proved sufficient in sixty-three per cent. of the cases. With hyoscyamine and homatropine the advantage is still more manifest; with the former sixty-nine per cent., and with the latter seventy-four per cent., used the drops three days or less.

I am aware that the method of using the mydriatics set forth in the above statements does not accord with the practice of many ophthalmic surgeons ; but, for the discussion as to its necessity and merits,

I must refer to the article on "The Relative Value of the Sulphates of Atropine and Duboisine" (*American Journal Medical Science*, April, 1880). It is sufficient to state here that in my experience a single instillation or a few hours' use of a four-grain solution of atropine (and stronger solutions seem in no wise superior) has often not been sufficient to thoroughly set aside the accommodation, even in healthy eyes. Continued use is therefore necessary, and, when used in the manner and for the purpose above indicated, it would seem that any one of the newer mydriatics is to be preferred to atropine, as regards the time of instillation required in the treatment of asthenopic eyes. Nor is this the only portion of the treatment which is greatly shortened by the new drugs, for they possess another property which adds to their superiority.

In the preceding table and remarks, attention has been given to that stage only which is marked by the instillation of the drops; that is, from the first use until the refraction has been determined and the mydriatic discontinued. It is extremely desirable when this, the objective point in the conduct of the case, has been attained, that the further annoyance from the mydriasis and the paralysis of accommodation shall be as brief as possible. The weary waiting for the return of the eyes to the normal in these respects, is a trial to the equanimity of the patient, and a cause of great inconvenience many times to the surgeon.

It is in this respect that the newer mydriatics present their strongest claim for preference, since they resign their control so much sooner than atropine. After the use of the atropine to the complete setting aside of the accommodation about a full week must elapse, even in young persons, before the ability to read is regained, and in most cases from ten days to two weeks (sometimes even more) is required before there is a complete recovery from its influence. With duboisine or hyoscyamine, however, the duration is quite different. The ability to read is regained in from three to four days, and on the fourth or fifth day the recovery is complete.

With homatropine the time is still shorter. Its influence begins to diminish about two hours after the last instillation, and in twenty-four or thirty hours has entirely vanished. Some patients are able to read moderately large print within six hours after the last use of the drops. The duration of the paralysis added to the average time the drops were instilled will give approximately the average duration of the treatment, or the time the patient has been debarred from reading, writing, and all near work requiring accurate vision. The

following table gives opportunity for a ready contrast, and sets forth very accurately the results of daily experience in the use of these drugs in the treatment of refraction errors:

TABLE II.

Mydriatic used.	Time required.	Duration of Paralysis.	Total Duration of Treatment.
Atropine	4 days.	10 to 14 days.	14 to 17 days.
Duboisine	3.4 days.	4 days.	7.4 days.
Hyoscyamine	3 days.	4+ days.	7+ days.
Homatropine	1.8 days.	1 day.	2.8 days.

That the new mydriatics are a great advantage both to patient and physician as time-savers is thus vividly portrayed. The most favorable showing that is possible for atropine would drop the total duration to about ten days, even after its use for a few hours, as is the habit of many surgeons, and the difference of time in favor of duboisine or hyoscyamine would still be a gain of quite one-half. If careful comparison should prove them to be equally reliable as agents to paralyze the accommodation, a strong case would be made out in favor of the new mydriatics—so strong, indeed, as to quite displace the atropine so far as it is used for the purpose to which this paper is devoted.

In order to secure opportunity for such comparison with atropine and with each other, all of the cases in which more than one of the group had been employed were collated, arranged in groups, and the respective results carefully compared. The following tables contain a brief statement of each case, giving the formula of the correcting-glasses selected under the use of each mydriatic employed in the case. It is believed that they furnish ample proof of the efficiency of these drugs for the accomplishment of the purpose in view.

The reliability of duboisine has been already too clearly established to stand in need of further evidence. Nevertheless, in Table III., page 244, are collected from my case-book the first sixteen cases which were found in which both atropine and duboisine had been in turn employed. In nine of these cases a careful correction had been made under atropine, and when after an interval of months or years a re-correction from some cause had seemed necessary, duboisine had been used. In six cases the duboisine correction had been revised

after varying intervals under atropine. In one, atropine had been used for a week immediately after the employment of duboisine for one hour. The results, set forth in detail in Table III., page 244, are further summarized in Table IX., page 254.

In Table IV., page 246, are recorded the results of 35 cases in which both homatropine and atropine were used. They fall naturally into four groups, A, B, C, and D. In 19 of these cases (Group A) the atropine was substituted for the homatropine without interval. In a number of these the use of the homatropine was purely experimental. It was instilled for a few hours, when a careful determination of the apparent error was made, but the ultimate correction took place under atropine. Such cases are generally indicated in the table by the short time the homatropine was used.

In Group B—Nos. 16 to 24 inclusive—the use of the atropine was experimental, the intention being that the correction should be made under the homatropine, and its accuracy tested by the atropine. These cases were, however, treated in dispensary practice, and the diminished sharpness of vision, as recorded, with the selected glasses, shows that the correction was not satisfactory—the disturbed condition of the interior of the eye, the want of care or intelligence upon the part of the patient, and the hurried determination under the pressure of the public clinic, all conspiring to prevent the greater accuracy secured in private practice. A third group—C, Nos. 30 to 32—comprises a few cases where, after an interval in which complete comfort had not been gained, a second determination of the refraction anomaly was made, with the employment of atropine to secure the prolonged paralysis of the ciliary muscle. The remaining cases—Group D—were those which had been corrected under atropine, at longer or shorter intervals previously, and, returning uncomfortable, were recorrected to prove or exclude errors in the former correction, or changes in the eyes since that determination. These last include a number of cases of progressive myopia, several of which had been proved such before by recorrection under atropine. In Groups A and B, among 38 eyes there was a distinct difference in 22 between the two determinations. In 16 of these the atropine revealed a higher hypermetropic or lower myopic refraction than was shown under the homatropine; but in 4 of these the latter had been used less than twenty-four hours, while the atropine had always the advantage of the rest secured by its predecessor. In 6 eyes, notwithstanding this advantage, the atropine failed to reveal as high H. or as low M. as the homatropine had done. In Group C, also,

the homatropine in 8 eyes showed higher H. or lower M. than was revealed previously by the atropine. It fell behind it, however, in 11 eyes, 9 of which were myopic, and by every optical test, and often by distinct pathological changes in the eye-ground, were proven to have suffered an actual increase in the myopia. The other two were the subjects of distinct swelling of the nerve, with haziness of the retina, flashes of light, etc.—neuroretinitis, in short, at the time of the atropine correction. In each of the three cases composing Group D, the prolonged use of atropine revealed a slightly higher H. or lower M. than had been shown by the homatropine two or three months before. In paralyzing the accommodation, therefore, in 70 eyes, the homatropine appeared superior to the atropine in 14 instances, equal in 23, inferior in 22, while there were 11 more in which the difference was due to actual increase in the length of the visual axis. Remembering that, in 16 of the 22 eyes in which the homatropine seemed inferior, the use of the atropine followed without interval, and that in 22 others with the same sequence the latter confirmed its predecessor, we see that the showing for homatropine is excellent; for, even in those cases where the atropine showed a still lower refraction, the probability still remains that, had the homatropine been continued, the result would have been the same as that reached under the atropine.

Table V. page 249, gives the results of 19 cases in which homatropine and duboisine were used in turn. Grouping these cases as before, we find that there were (Groups A and B) 12 cases where the duboisine was substituted without interval; (C), 6 where the correction, once made under the duboisine, was gone over under homatropine after an interval varying from two months to two years; and (D) 1 case where the homatropine followed the other mydriatic without interval. In Groups A and B the results were at variance in 13 eyes, in 10 of which the advantage was on the side of duboisine, and in 3 in favor of homatropine. In Group C, 5 results were different, 1 counting for duboisine, 3 for homatropine, while 1 was due to progressive myopia. In the one case—No. 19 of the table—where the homatropine was used immediately after the duboisine, there was very marked choroido-retinal irritation and spasm of accommodation. These at first lessened under the duboisine, but began again to increase; under homatropine they disappeared, and a lower concave glass gave better vision than was obtainable under the other mydriatic.

Therefore, in 38 eyes, homatropine appeared to a disadvantage in 11, on an equality in 18, superior in 8; and there was one instance

where the change had to be ascribed to actual lengthening of the eyeball. In view of the fact that in 24 of these instances the duboisine was used in an eye already put at rest by the homatropine, while in but 2 was this sequence reversed, the showing is distinctly favorable to the homatropine.

In Table VI., page 252, are compared 15 cases in which both atropine and hyoscyamine were employed. In 9 of these (Groups A and B) the hyoscyamine was used, to be immediately followed by atropine. These again were dispensary cases, with the disadvantages noted under the same head in the remarks on Table III., page 244. (C) In a single case the atropine was employed after an interval of two weeks, the eyes remaining uncomfortable. (D) In five cases the atropine determination had been previously made, and after an interval of years the recorrection was undertaken under hyoscyamine. In Groups A and B there was variation in 9 eyes, 8 of these being in favor of atropine, 1 in favor of hyoscyamine. In Group D the hyoscyamine showed error in the atropine correction in three instances, while there were two of progressive myopia. In the one case under G—No. 4 of the table—there was great improvement of the condition of the eye-ground under hyoscyamine, and the choroido-retinal irritation largely disappeared. The remaining trouble did not, however, decrease after the withdrawal of the mydriatic; and when after two weeks atropine was given, it was found necessary to use it steadily for three weeks before the eyes were quiet and comfortable. A slightly higher hypermetropic refraction was then found.

In 29 eyes, then, the hyoscyamine compared unfavorably with atropine in 10; was on an equality in 13; in 4 proved superior, while the other two variations were due to progressive myopia. In seventeen of these eyes the atropine mydriasis succeeded without interval that of the hyoscyamine.

Table VII., page 253, shows three cases in which, a former duboisine correction proving unsatisfactory, the determination was again made under hyoscyamine. In one of these cases the result was a verification of the duboisine correction; in the other two the hyoscyamine showed a lower myopic or a higher hypermetropic refraction. In five eyes, therefore, it equalled duboisine in one instance and surpassed it in four, as a paralysant of the accommodation.

Table VIII., page 254, shows two cases in which both homatropine and hyoscyamine were employed. In the first, homatropine was used two years after an atropine correction (*vide* No. 34, Table IV., page 249, and No. 15, Table VI., page 253), and an apparent

change toward myopia found. Not satisfied with this result, hyoscyamine was given a few months later, and a commencing myopia demonstrated in the right eye, while the apparent increase of myopia in the left was proven to be functional only, and the former atropine correction shown to have been slightly in error. In the second case, after two days' use of the homatropine, without interval, hyoscyamine was used for an hour and a quarter, and the result obtained under the first mydriatic confirmed.

Summarizing these results, then, and leaving out of consideration the cases of progressive myopia, we obtain the showing given in Table IX., page 254

Although these figures possess some value as showing the results of experience, they do not exhibit all the facts, and consequently do not furnish a complete basis for a comparison. They have served to demonstrate, not only that the newer mydriatics are efficient agents both for paralyzing the accommodation and allaying the retino-choroidal irritation ; but that the time required in the treatment of asthenopic eyes is much shorter than was formerly required under the use of atropine.

With these numerous efficient drugs at our disposal, it is proper to inquire whether they are equally valuable in all cases, so that one or the other may be indifferently employed. The ground for selection is usually the presence or absence of pathological changes in the eye-ground. If, for example, the retina and choroid are comparatively healthy, and there is but little tendency to accommodative spasm or cramp, homatropine should be chosen, since by its use the inconvenience to the patient growing out of the mydriasis and paralysis of accommodation is placed at the minimum. If, on the other hand, there is well-marked retinal irritation and choroidal disturbance, with the usually attending symptoms of photophobia and ciliary cramp, one of the other mydriatics is to be preferred. It has already been pointed out that an important object in employing a mydriatic is to secure the complete quiet of the ciliary muscle, since it is largely upon its effort to overcome the error of refraction that the asthenopia depends. In cases of this character the necessity for prolonged paralysis frequently presents itself, and in order to secure constant and prolonged rest of the accommodation, one of the more persistent mydriatics should be selected. It will be seen, therefore, that the property which most commends the homatropine in comparison with the other members of the group, viz., its evanescent control over the accommodation and iris, detracts from its util-

ity when employed in severe cases of asthenopia. A careful study of the returning accommodation after the use of the respective mydriatics has revealed certain peculiarities which are important as aiding in their selection. After the use of atropine the maximum effect is gained and immediately declines, the return of the accommodative function being gradual and constant until the original near point is recovered. This, however, is followed by several days of weakness, so that the near point can be maintained for only a short time. This period of weakness after recovery of the near point is common to all members of the group, but is more noticeable after atropine. The returning function after paralysis by homatropine is also constant and gradual within the time required—about twenty-four hours.

The case is, however, different after paralysis with hyoscyamine.

Although the time required for the full re-establishment of the function of accommodation is much shorter (less than one-half that required by atropine), nevertheless the duration of the absolute paralysis is much greater. The maximum impression, having been reached, is apparently maintained for many hours. In my own eye, after twenty-four hours, there was only the slightest indication of any returning accommodation. With duboisine, observation on this point is wanting. If subsequent investigation should confirm the above observation, it will furnish theoretical grounds for the fact which the preceding clinical studies have seemed to demonstrate, viz., that the hyoscyamine is superior to atropine, in that the time required for its use in allaying the choroidal disturbance falls far below that required by atropine in the same class of cases. It may be that the explanation is found in the more prolonged and firmer grasp in which it holds the ciliary muscle.

It would seem, therefore, that in the treatment of severe cases of asthenopia, where prolonged and perfect rest of the ciliary muscle is desirable, that hyoscyamine, and possibly duboisine, are to be preferred to homatropine, or even to atropine, notwithstanding the comparatively long time the latter holds the accommodation in abeyance or partial control. In cases, however, where the necessity for prolonged rest of the accommodation is not presented, advantage should be taken of the rapid decline of the paralysis and mydriasis following the use of homatropine.

Furthermore, the homatropine holds out the additional advantage of almost entire immunity from unpleasant constitutional disturbance. In the atropine and duboisine paper it was pointed out that

four-grain solutions of the sulphate of duboisine could not be safely employed; but that in solutions not stronger than gr. ij. to f. ʒ j., it could be used with safety, and that, too, with less frequent annoyance from constitutional disturbance than was produced by the *four-grain* solution of the sulphate of atropine. Nevertheless, even the two-grain solution occasionally gave rise to the general disturbance, *i.e.*, hurried pulse, giddiness, and a sense of weakness in the lower extremities. In two cases attacks of biliary derangement, with marked prostration, came on during the protracted instillation of the duboisine, and seemed to depend upon its use, although it at first caused none of the usual constitutional impressions. No such experiences have thus far been had with the hyoscyamine, which has invariably been used in a solution of grains ij. to f. ʒ j. three times daily. In a few cases, however, it was also attended with well-marked general symptoms, which in many respects were similar to the effect produced by the duboisine, but was not marked by the weakness in the lower extremities, nor by the prostration which characterized, in a measure, the poisoning by the duboisine. The employment of hyoscyamine, therefore, has, on the whole, been more satisfactory than that of duboisine. In one instance the retinal irritation increased under the duboisine, but rapidly subsided under homatropine—a fact which would seem to indicate that there is some room for choice in selecting the member of the group to be employed in *individual cases.*

With homatropine the possibility of constitutional derangement is so remote as to place it beyond serious consideration. The experience in its use, as set forth in this paper, has been almost invariably with a solution of the hydrobromate of homatropine, gr. vi. to f. ʒ j. The method of employment has differed widely from that in the case of atropine, duboisine, or hyoscyamine.

Two drops of the above solution were instilled, at home, every three hours. At the office, prior to the final determination of the refraction, the drops were used every fifteen minutes, and in an hour to an hour and a half the measurement was undertaken. In only one case was there any constitutional annoyance at all comparable to the symptoms so frequently produced by the atropine solution, and less frequently by the duboisine and hyoscyamine. In this exceptional case, by a misunderstanding, the six-grain solution was continued at home every two hours, after repeated instillations in the office.

The repeated instillations, and careful oversight of the case, which

are necessary to secure a perfect paralysis of the ciliary muscle by homatropine, furnish a great drawback to its employment, because of the attendant inconvenience. The prolonged detention leads to undue crowding of the consultation-rooms, and, in order to complete the measurement for glasses, not infrequently necessitates detention beyond the hours allotted for consultation.

The solutions in distilled water have proved efficient and more satisfactory than other preparations. The readiness with which the solutions were carried away with the tears into the nose, and thence to the stomach, seemed to be the source of the constitutional impression. In order to avoid this, other menstrua were tried, but abandoned. Gelatine wafers were efficient, but seemed to possess no advantages over the solutions in water, and were less convenient. In the treatment of inflammations of the conjunctiva or cornea, the incorporation of the drugs with cosmoline or vaseline furnishes an excellent method of administration, but does not answer for their employment in correcting refraction errors. The unctuous material is retained in the conjunctival sac for a long time, and forms a thin film over the surface of the cornea, marring its transparency, and thus effectually preventing, for the time-being, any successful effort at correction of the error of refraction.

Conjunctival irritation not infrequently resulted from the protracted employment of the solutions, but only in minor degrees, and was not a sufficient source of annoyance to claim more than a passing notice.

Where any complaint was made of the drops smarting, a single application of the alum-crystal was sufficient to remove the annoyance. A single notable exception to this is detailed in the paper on "The Relative Value of the Sulphates of Atropine and Duboisine," before cited.

In that case both atropine and duboisine caused severe irritation. This had occurred in other cases, in my earlier experience, where sulphate of atropia was used, but in every instance the solution was shown to be acid in its reaction, and the trouble disappeared under the use of a neutral solution.

In no instance was there any noticeable increase of the tension of the eyeball, even after protracted use. In a few instances the duboisine was discontinued, because of an evident increase in the choroido-retinal irritation, which depended apparently upon its use. In each case homatropine was substituted, with the effect of relieving the irritation and increased sensitiveness to light.

These cases, however, suffered very much from the constitutional effect of the duboisine.

From the foregoing the following conclusions seem justifiable:

First.—That the sulphates of atropine, duboisine, and hyoscyamine, and the hydrobromate of homatropine, are efficient agents for paralyzing the accommodative function, and in the treatment of asthenopic eyes.

Second.—That, in the employment of the last three named, the duration of the treatment is very much shortened.

Third.—That, for the correction of anomalies of refraction, in otherwise normal eyes, the homatropine is to be preferred.

Fourth.—That, if retino-choroidal disturbance is also present, hyoscyamine or duboisine are preferable: (*a*) to atropine, because of the shorter duration of the treatment; (*b*) to homatropine, because of their more persistent control over the ciliary muscle.

Fifth.—That hyoscyamine is preferable to duboisine, since the tendency to systemic poisoning is not so great.

In closing this paper, I desire to express my great indebtedness to Dr. B. Alexander Randall for his untiring aid in its preparation.

NOTE.—It will be proper to state that the preparations of hyoscyamine which have of late been furnished me, have seemed more persistent in their control of the accommodation than those first employed. In a few instances this has been so markedly the case as to justify the suspicion that atropine had been used to substitute or adulterate the hyoscyamine.

TABLE III.—A COMPARISON OF DUBOISINE AND ATROPINE IN THE SAME CASES.

No.	Age.	Duboisine used.	Formula of Correction.	Vision.	Atropine used.	Formula of Correction.	Vision.	Remarks.
1	11	12 days.	O. D. $+\frac{1}{12}$ c. ax. 105°.....	$\frac{20}{XXX}$	4 days.	O. D. $+\frac{1}{12}$ c. ax. 105°.....	$\frac{20}{XXX}$?	Duboisine 8 mos. subsequent to atropine.
			O. S. $+\frac{1}{16}$ c. ax. 90°.....	$\frac{20}{XXX}$		O. S. $+\frac{1}{16}$ c. ax. 90°.....	$\frac{20}{XXX}$?	
2	11	7 "	O. D. $+\frac{1}{48}$ s. ○ $-\frac{1}{10}$ c. ax. 15°..	$\frac{20}{XX}$	26 "	O. D. $+\frac{1}{48}$ (or $\frac{1}{60}$ s.) ○ $+\frac{1}{10}$ c. ax. 15°.....	$\frac{20}{XX}$?	Myopia steadily progressive. Numerous corrections between. Atropine 5 and 8 mos. subsequent to duboisine.
			O. S. $-\frac{1}{12}$ c. ax. 180°.....	$\frac{20}{XX}$	12 "	O. S. $-\frac{1}{12}$ c. ax. 180°.....	$\frac{20}{XX}$?	
3	30	3 "	O. D. $+\frac{1}{48}$ s. ○ $-\frac{1}{20}$ c. ax. 15°..	$\frac{20}{XX}$	5 "	O. D. $-\frac{1}{60}$ s. ○ $-\frac{1}{20}$ c. ax. 15°....	$\frac{20}{XXX}$	Duboisine 18 mos. subsequent to atropine.
			O. S. $-\frac{1}{48}$ s. ○ $-\frac{1}{30}$ c. ax. 10°..	$\frac{20}{XX}$		O. S. $-\frac{1}{60}$ ○ $-\frac{1}{30}$ c. ax. 15°.....	$\frac{20}{XXX}$	Progressive myopia (?).
4	14	5 "	O. D. $+\frac{1}{60}$ c. ax. 135°.....	$\frac{20}{XX}$	14 "	O. D. $+\frac{1}{72}$ s. ○ $+\frac{1}{60}$ c. ax. 135°...	$\frac{20}{XX}$	Marked choroido-retinal irritation.
			O. S. $+\frac{1}{60}$ c. ax. 45°.....	$\frac{20}{XX}$		O. S. $+\frac{1}{72}$ s. ○ $-\frac{1}{60}$ c. ax. 45°....	$\frac{20}{XX}$	Atropine 9 mos. after duboisine.
5	24	3 "	O. D. $-\frac{1}{30}$ s.....	$\frac{20}{XX}$	4 "	O. D. $-\frac{1}{72}$ s.....	$\frac{20}{XVI}$	Progressive myopia; high insuf. intern.
			O. S. $-\frac{1}{42}$ s. ○ $-\frac{1}{72}$ c. ax. 30°..	$\frac{20}{XX}$		O. S. $-\frac{1}{72}$ s.....	$\frac{20}{XVI}$	Duboisine 4 yrs. after atropine.
6	34	1 day.	O. D. $-\frac{1}{36}$ s. ○ $-\frac{1}{4}$ c. ax. 20°..	$\frac{20}{XX}$	7 "	O. D. $-\frac{1}{36}$ s. ○ $-\frac{1}{60}$ c. ax. 15°....	$\frac{20}{XX}$	Duboisine 18 mos. after atropine.
			O. S. $-\frac{1}{30}$ s. ○ $-\frac{1}{60}$ c. ax. 180°.	$\frac{20}{XX}$		O. S. $-\frac{1}{24}$ s. ○ $-\frac{1}{48}$ c. ax. 180°...	$\frac{20}{XX}$	
7	19	2 days.	O. D. $+\frac{1}{14}$ s. (or $+\frac{1}{16}$ s.) ○ $+\frac{1}{36}$ c. ax. 75°...	$\frac{20}{XX}$	4 "	O. D. $+\frac{1}{18}$ s. ○ $+\frac{1}{30}$ c. ax. 75°....	$\frac{20}{XXX}$?	Duboisine 2 yrs. after atropine.
			O. S. $+\frac{1}{42}$ s. ○ $+\frac{1}{42}$ c. ax. 75°..	$\frac{20}{XX}$?		O. S. $+\frac{1}{48}$ s. ○ $+\frac{1}{30}$ c. ax. 75°....	$\frac{20}{XXX}$?	
8	20	1 day.	O. D. $+\frac{1}{36}$ s. ○ $-\frac{1}{9}$ c. ax. 180°.	$\frac{20}{XL}$? ?	.....	O. D. $+\frac{1}{36}$ c. ax. 90 ⌊ ○ $-\frac{1}{10}$ c. ax. 180°.....	$\frac{10}{XX}$?	Duboisine 3 yrs. after atropine.
			O. S. $-\frac{1}{72}$ s. ○ $-\frac{1}{24}$ c. ax. 180°.	$\frac{20}{XX}$?	.....	O. S. $-\frac{1}{72}$ s. ○ $-\frac{1}{24}$ c. ax. 180°...	$\frac{10}{XL}$?	

9	35	4 days.	O. D. $-\frac{1}{6.5}$ s. ○ $-\frac{1}{7\frac{1}{2}}$ c. ax. 30°.	$\frac{20}{xl}$ +	20 days.	O. D. $-\frac{1}{6.5}$ s. or $-\frac{1}{6}$ s.	$\frac{20}{xxx}$??	Progressive myopia.
			O. S. $-\frac{1}{6.5}$ s. ○ $-\frac{1}{12}$ c. ax. 15°.	$\frac{20}{xl}$ +		O. S. $-\frac{1}{6.5}$ s. ○ $-\frac{1}{12}$ c. ax. 15°.	$\frac{20}{xxx}$?	Atropine 6 mos. after duboisine.
10	13	1 hour.	O. D. $+\frac{1}{3.5}$ s.	$\frac{20}{xxx}$	7	O. D. $+\frac{1}{3.5}$ s.	....	Atropine substituted without interval.
			O. S. $+\frac{1}{3.5}$ s.	$\frac{20}{xxx}$	"	O. S. $+\frac{1}{3.5}$ s.	....	
11	29	7 days.	O. D. $-\frac{1}{1.5}$ s. ○ $-\frac{1}{6.0}$ c. ax. 105°.	$\frac{20}{xxx}$	4	O. D. $-\frac{1}{1.5}$ s. (○ $-\frac{1}{6.0}$ c. ax. 90° ?).	$\frac{20}{xxx}$	Duboisine 14 mos. after atropine.
			O. S. $-\frac{1}{1.5}$ s. ○ $-\frac{1}{6.0}$ c. ax. 75°.	$\frac{20}{xxx}$	"	O. S. $-\frac{1}{1.5}$ s.	$\frac{20}{xxx}$	
12	25	7 "	O. D. $-\frac{1}{1.5}$ s.	$\frac{20}{xx}$	5	O. D. $-\frac{1}{1.5}$ s.	$\frac{20}{xx}$	Atropine 14 mos. after duboisine.
			O. S. $-\frac{1}{1.5}$ s. ○ $-\frac{1}{7.5}$ c. ax. 30°.	$\frac{20}{xx}$	"	O. S. $-\frac{1}{1.5}$ s. ○ $-\frac{1}{7.5}$ c. ax. 30°.	$\frac{20}{xx}$	
13	25	2 "	O. D. $-\frac{1}{7.5}$ c. ax. 60°.	$\frac{20}{xx}$	27	O. D. Em.	$\frac{10}{x}$	Insufficiency of interni.
			O. S. $+\frac{1}{7.5}$ c. ax. 90°.	$\frac{20}{xx}$	"	O. S. Em.	$\frac{10}{x}$	Duboisine 2½ yrs. after atropine.
14	20	11 "	O. D. $-\frac{1}{4.5}$ s.	$\frac{20}{xx}$	7	O. D. $-\frac{1}{4.5}$ s.	$\frac{20}{xx}$	Duboisine 15 mos. after atropine.
			O. S. $-\frac{1}{6.0}$ s. or $-\frac{1}{7.5}$ s.	$\frac{20}{xx}$	"	O. S. $-\frac{1}{6.0}$ s.	$\frac{20}{xx}$	
15	22	3 "	O. D. $+\frac{1}{4.5}$ s. ○ $+\frac{1}{7.5}$ c. ax. 90°.	$\frac{20}{xv}$	7	O. D. $+\frac{1}{4.5}$ s. ○ $+\frac{1}{4.5}$ c. ax. 100°.	...	Atropine 1 year after duboisine.
			O. S. $+\frac{1}{4.5}$ s. ○ $+\frac{1}{6.0}$ c. ax. 90°.	$\frac{20}{xv}$	"	O. S. $+\frac{1}{4.5}$ s. ○ $+\frac{1}{6.0}$ c. ax. 80°.	...	
16	7½	4 "	O. D. $+\frac{1}{2.5}$ s. ○ $+\frac{1}{6.0}$ c. ax. 90°.	$\frac{20}{xxx}$?	7	O. D. $+\frac{1}{2.5}$ s. ○ $+\frac{1}{4.5}$ c. ax. 90°.	$\frac{20}{xxx}$	Atropine 2 yrs. after duboisine.
			O. S. $+\frac{1}{2.5}$ s. ○ $+\frac{1}{4.5}$ c. ax. 90°.	$\frac{20}{xxx}$?	"	O. S. $+\frac{1}{2.5}$ s. ○ $+\frac{1}{3.0}$ c. ax. 90°.	$\frac{20}{xxx}$	

TABLE IV.—A COMPARISON OF HOMATROPINE AND ATROPINE IN THE SAME CASES.

No.	Age.	Homatropine used.	Formula of Correction.	Vision.	Atropine used.	Formula of Correction.	Vision.	Remarks.
1	22	48 hours.	O. D.—$\frac{1}{60}$ s. or —$\frac{1}{72}$ s. O. S.—$\frac{1}{60}$ s.	$\frac{20}{XX}$ $\frac{20}{XX}$	2 days.	O. D.—$\frac{1}{72}$ s. O. S.—$\frac{1}{72}$ s.	$\frac{20}{XX}$ $\frac{20}{XX}$	Atropine immediately following. Spasm of accom.
2	47	20 "	O. D.+$\frac{1}{9}$ s.○+$\frac{1}{48}$ c. ax. 90°... O. S.+$\frac{1}{9}$ s.	$\frac{20}{XXV}$?	5 "	O. D.+$\frac{1}{8}$ s.○+$\frac{1}{48}$ c. ax. 90°..... O. S.+$\frac{1}{8}$ s.	$\frac{20}{XX}$? $\frac{20}{XX}$?	Neuro-retinitis. Atrop. correction 2½ years previous.
3	41	6 "	O. D.—$\frac{1}{16}$ c. ax. 60°..... O. S.—$\frac{1}{48}$ c. ax. 120°.....	$\frac{20}{XXV}$ $\frac{20}{XX}$	2 "	O. D.—$\frac{1}{16}$ c. ax. 60°..... O. S.—$\frac{1}{24}$ c. ax. 120°.....	$\frac{20}{XXV}$+ $\frac{20}{XX}$	Atrop. immediately after hom.
4	28	1½ hour.	O. D.+$\frac{1}{24}$ s.○+$\frac{1}{16}$ c. ax. 75°.. O. S.+$\frac{1}{20}$ s.○+$\frac{1}{30}$ c. ax. 120°.	$\frac{20}{I}$ $\frac{20}{XI}$?	3 "	O. D.+$\frac{1}{16}$ s.○+$\frac{1}{10}$ c. ax. 60°.... O. S.+$\frac{1}{10}$ s.○+$\frac{1}{24}$ c. ax. 120°...	$\frac{20}{XXX}$+ $\frac{20}{XI}$ +	Marked chor. ret. irritation. Atr. immediately after hom.
5	20	1 "	O. D.—$\frac{1}{12}$ s.○—$\frac{1}{60}$ c. ax. 90°.. O. S.—$\frac{1}{10}$ s.○—$\frac{1}{60}$ c. ax. 90°..	$\frac{20}{XX}$ $\frac{20}{XX}$	3 "	O. D.—$\frac{1}{13}$ s.○—$\frac{1}{72}$ c. ax. 105°... O. S.—$\frac{1}{12}$ s.○—$\frac{1}{72}$ c. ax. 75°....	$\frac{20}{XX}$ $\frac{20}{XX}$	Progressive myopia. Atrop. correction 3 years previous.
6	22	96 hours.	O. D.—$\frac{1}{8}$ s.○—$\frac{1}{36}$ c. ax. 170°.. O. S.—$\frac{1}{12}$ s.○—$\frac{1}{18}$ c. ax. 40°..	$\frac{20}{XX}$ $\frac{20}{XX}$	4 "	O. D.—$\frac{1}{8}$ s.○—$\frac{1}{48}$ c. ax. 165°.... O. S.—$\frac{1}{16}$ s.○—$\frac{1}{18}$ c. ax. 35°....	$\frac{20}{XX}$? $\frac{20}{XX}$?	Progressive myopia. Atrop. correction 3½ years previous.
7	54	9 days.	O. D.+$\frac{1}{60}$ s..... O. S.+$\frac{1}{48}$ s.....	$\frac{20}{XX}$ $\frac{20}{XX}$	3 "	O. D.+$\frac{1}{48}$ s..... O. S.+$\frac{1}{72}$ s.○+$\frac{1}{72}$ c. ax. 90°....	$\frac{20}{XX}$ $\frac{20}{XX}$	Marked hyperæsthesia ret. Atr. immediately after hom.
8	26	24 hours.	O. D.(+$\frac{1}{72}$?)○—$\frac{1}{24}$ c. ax. 120° O. S.—$\frac{1}{18}$ s. or—$\frac{1}{30}$ s.○—$\frac{1}{30}$ c. ax. 60°.....	$\frac{20}{XX}$? $\frac{20}{I}$	1 day.	O. D.+$\frac{1}{72}$ s.○—$\frac{1}{24}$ c. ax. 120°... O. S.—$\frac{1}{18}$ s.○—$\frac{1}{24}$ c. ax. 60°....	$\frac{20}{XX}$+ $\frac{20}{XI}$?	Atr. immediately after hom.
9	38	72 "	O. D.—$\frac{1}{6}$ s.○—$\frac{1}{24}$ c. ax. 180°.. O. S.—$\frac{1}{6.5}$ s.○—$\frac{1}{30}$ c. ax. 25°..	$\frac{20}{XXV}$? $\frac{20}{XXV}$?	2 days.	O. D.—$\frac{1}{6}$○—$\frac{1}{24}$ c. ax. 180°..... O. S.—$\frac{1}{6.3}$○—$\frac{1}{30}$ c. ax. 25°.....	$\frac{20}{XXV}$ $\frac{20}{XXV}$?	Progressive myopia. Atr. immediately after hom.

10	18	18 hours.	O. D. $+\frac{1}{4}$ c. ax. 105°	20/xx	12	"	O. D. $+\frac{1}{2}$ s. (or $+\frac{1}{4}$ s.) ○ $+\frac{1}{2}$ c. ax. 90°	20/xx	Marked ret. irritation. Atr. immediately after hom.
			O. S. $+\frac{1}{6}$ s. ○ $+\frac{1}{2}$ c. ax. 75°	20/xx			O. S. $+\frac{1}{6}$ s. (or $+\frac{1}{4}$ s.) ○ $+\frac{1}{2}$ c. ax. 75°	xx/20	Atr. corr. 4 yrs. before, $+\frac{1}{4}$ c. ax. 75°.
11	19	48 "	O. D. $-\frac{1}{2}$ s. ○ $-\frac{1}{6}$ c. ax. 15°	20/xx	3	"	O. D. $-\frac{1}{2}$ c. ax. 10°	20/xx	Atr. immediately after hom.
			O. S. $-\frac{1}{6}$ s. ○ $-\frac{1}{2}$ c. ax. 15°	20/xvi			O. S. $-\frac{1}{4}$ s. ○ $-\frac{1}{6}$ c. ax. 15°	20/xx	Marked ret. irritation.
12	21	48 "	O. D. $+\frac{1}{2}$ s. ○ $+\frac{1}{6}$ c. ax. 105°	20/xx	2	"	O. D. $+\frac{1}{2}$ s. ○ $+\frac{1}{6}$ c. ax. 105°	...	Atr. substituted to subdue remaining ret. irritation.
			O. S. $+\frac{1}{2}$ s. ○ $+\frac{1}{6}$ c. ax. 90°	20/xx			O. S. $+\frac{1}{2}$ s. ○ $+\frac{1}{6}$ c. ax. 90°	...	
13	7	3 "	O. D. $+\frac{1}{4}$ s. ○ $+\frac{1}{2}$ c. ax. 75°	20/i	7	"	O. D. $+\frac{1}{4}$ s. ○ $+\frac{1}{2}$ c. ax. 75°	20/i	Alternating strabismus and amblyopia. V. later O. D. $\frac{20}{xxx}$??.
			O. S. $+\frac{1}{4}$ s. ○ $+\frac{1}{4}$ c. ax. 105°	20/xxx+			O. S. $+\frac{1}{4}$ s. ○ $+\frac{1}{4}$ c. ax. 105°	20/xxv?	
14	18	24 "	O. D. $+\frac{1}{2}$ s.	20/xx	....		O. D. $+\frac{1}{6}$ s.	...	Atr. correction by another previously. Dubois. later.
			O. S. $+\frac{1}{2}$ s.	20/xx			O. S. $+\frac{1}{6}$ s.	...	
15	45	7 days.	O. D. $+1\frac{1}{4}$ s.	20/xx ?	2	"	O. D. $+1\frac{1}{4}$ s.	20/xx+	Neuro-retinitis. Atr. immediately after hom. Again later.
			O. S. $+1\frac{1}{8}$ s.	20/xx ?	20	"	O. S. $+1\frac{1}{8}$ s. ○ $+\frac{1}{2}$ c. ax. 75°	20/xx+	
16	23	72 hours.	O. D. $+\frac{1}{8}$ s. ○ $+\frac{1}{30}$ c. ax. 45°	15/xxx	1 day.		O. D. $+\frac{1}{8}$ s. ○ $+\frac{1}{20}$ c. ax. 45°	15/xxx?	Atr. immediately after hom.
			O. S. $+\frac{1}{30}$ s. ○ $+\frac{1}{6}$ c. ax. 165°	15/xii			O. S. $+\frac{1}{24}$ ○ $+\frac{1}{30}$ c. ax. 165°	15/xii	
17	26	48 "	O. D. Em.	...	1	"	O. D. Em.	...	Atr. immediately after hom.
			O. S. $-1\frac{1}{2}$ s. ○ $-\frac{1}{6}$ c. ax. 45°	...			O. S. $-1\frac{1}{2}$ s. ○ $-\frac{1}{6}$ c. ax. 45°	...	
18	28	48 "	O. D. $+\frac{1}{6}$ c. ax. 90°	15/xvi	1	"	O. D. $+\frac{1}{6}$ c. ax. 85°	15/xii	Atr. immediately after hom.
			O. S. $+\frac{1}{6}$ c. ax. 105°	15/xii			O. S. $+\frac{1}{6}$ c. ax. 100°	15/xii	
19	14	72 "	O. D. $-\frac{1}{8}$ s. ○ $-\frac{1}{4}$ c. ax. 180°	15/xxx	3 days.		O. D. $-\frac{1}{8}$ s. ○ $-\frac{1}{24}$ c. ax. 180°	15/xx	Atr. immediately after hom.
			O. S. $-\frac{1}{6.3}$ s.	15/xxx			O. S. $-\frac{1}{8}$ s.	15/xx	
20	20	48 "	O. D. $+\frac{1}{4}$ s.	15/xvi	1 day.		O. D. $+\frac{1}{4}$ s.	15/xvi	Atr. immediately after hom.
			O. S. $+\frac{1}{4}$ s.	15/xvi			O. S. $+\frac{1}{4}$ s.	15/xvi	

TABLE IV.—A COMPARISON OF HOMATROPINE AND ATROPINE IN THE SAME CASES.—*Continued.*

No.	Age.	Homatropine used.	Formula of Correction.	Vision.	Atropine used.	Formula of Correction.	Vision.	Remarks.
21	13	48 hours.	O. D. $+\frac{1}{30}$ s. ○ $+\frac{1}{48}$ c. ax. 90°..	$\frac{15}{XX}$	5 days.	O. D. $+\frac{1}{24}$ s. ○ $+\frac{1}{48}$ c. ax. 90°....	$\frac{15}{XVI}$	Atr. immediately after hom.
			O. S. $+\frac{1}{30}$ s. ○ $+\frac{1}{60}$ c. ax. 90°..	$\frac{15}{XX}$		O. S. $+\frac{1}{24}$ s. ○ $+\frac{1}{60}$ c. ax. 90°....	$\frac{15}{XVI}$	
22	20	48 "	O. D. $+\frac{1}{60}$ s.....	...	2 "	O. D. $+\frac{1}{30}$ s.....	...	Atr. immediately after hom.
			O. S. $+\frac{1}{72}$ s. ○ $+\frac{1}{60}$ c. ax. 120°.	...		O. S. $+\frac{1}{72}$ s. ○ $+\frac{1}{60}$ c. ax. 120°....	...	
23	37	72 "	O. D. $+\frac{1}{24}$ s.....	$\frac{15}{XX}$	1 day.	O. D. $+\frac{1}{20}$ s.....	$\frac{15}{XVI}$	Atr. immediately after hom.
			O. S. $+\frac{1}{24}$ s.....	$\frac{15}{XX}$		O. S. $+\frac{1}{20}$ s.....	$\frac{15}{XVI}$	
24	20	48 "	O. D. $+\frac{1}{30}$ s. ○ $+\frac{1}{48}$ c. ax. 90°..	$\frac{15}{XVI}$?	1 "	O. D. $+\frac{1}{42}$ s. ○ $+\frac{1}{48}$ c. ax. 90°....	$\frac{15}{XVI}$?	Atr. immediately after hom.
			O. S. $+\frac{1}{48}$ s. ○ $+\frac{1}{48}$ c. ax. 75°..	$\frac{15}{XVI}$		O. S. $+\frac{1}{48}$ s. ○ $+\frac{1}{48}$ c. ax. 75°....	$\frac{15}{XVI}$?	
25	33	26 "	O. D. $-\frac{1}{72}$ c. ax. 165°.....	$\frac{20}{XX}$	3 days.	O. D. Em	$\frac{20}{XX}$	Atr. correction 2½ yrs. before.
			O. S. $-\frac{1}{60}$ c. ax. 75°.....	$\frac{20}{XX}$?		O. S. $-\frac{1}{60}$ c. ax. 75°.....	$\frac{20}{XX}$	Ret. irritation and insuf. of Int.
26	19	24 "	O. D. $-\frac{1}{72}$ s. ○ $+\frac{1}{36}$ c. ax. 90°.	$\frac{20}{XX}$ +	2 "	O. D. $+\frac{1}{48}$ c. ax. 90°.....	$\frac{20}{XX}$	Atr. correction 2 yrs. previous.
			O. S. $-\frac{1}{72}$ s.....	$\frac{20}{XX}$		O. S. $+\frac{1}{60}$ c. ax. 60°.....	$\frac{20}{XX}$	Commencing myopia O. S.
27	37	2½ "	O. D. $+\frac{1}{60}$ c. ax 90°....	$\frac{20}{XX}$?	2 "	O. D. $+\frac{1}{72}$ s. ○ $+\frac{1}{60}$ c. ax. 60°....	$\frac{20}{XX}$	Atr. correction 1 yr. previous.
			O. S. $+\frac{1}{48}$ c. ax. 120 ∟ ○ $-\frac{1}{72}$ c. ax. 30°.....	$\frac{20}{XX}$?		O. S. $+\frac{1}{30}$ c. ax. 120°.....	$\frac{20}{XX}$	Commencing myopia O. S.
28	14	18 "	O. D. $+\frac{1}{8}$ s. ○ $+\frac{1}{18}$ c. (or $+\frac{1}{10}$ c. ax. 75°....	$\frac{20}{XXX}$ +	3 "	O. D. $+\frac{1}{8}$ s. ○ $+\frac{1}{18}$ c. ax. 75°....	$\frac{20}{04}$	Atr. correction 1 yr. before.
			O. S. $+\frac{1}{8.3}$ s. ○ $+\frac{1}{24}$ c. ax. 105°	$\frac{20}{XXX}$ +		O. S. $+\frac{1}{8.3}$ s. ○ $+\frac{1}{24}$ c. ax. 105°..	$\frac{20}{32}$ +	Marked improvement in V. O. D.
29	35	3 "	O. D. $+\frac{1}{60}$ s. ○ $+\frac{1}{48}$ c. ax. 90°.	$\frac{20}{XX}$	15 hours.	O. D. $+\frac{1}{60}$ s. ○ $+\frac{1}{60}$ c. ax. 90°....	$\frac{10}{VIII}$?	Atr. correction 4 yrs. before.
			O. S. $+\frac{1}{60}$ s. ○ $+\frac{1}{48}$ c. ax. 90°..	$\frac{20}{XX}$		O. S. $+\frac{1}{60}$ s. ○ $+\frac{1}{60}$ c. ax. 90°...	$\frac{10}{VIII}$?	

30	26	20 days.	O. D. $+\frac{1}{12}$ s.	20/xx	8 days.	O. D. $+\frac{1}{30}$ s.	20/xx	Neuro-retinitis (?).
			O. S. $+\frac{1}{60}$ s. or $+\frac{1}{12}$ s.	20/xx		O. S. $+\frac{1}{12}$ s.	20/xx	Atr. correction 3 mos. later.
31	12	48 hours.	O. D. $+\frac{1}{48}$ s.	20/xx	4 "	O. D. $+\frac{1}{48}$ s. ($+\frac{1}{12}$ s.?)	20/xvi ?	Atr. correction 3 mos. later.
			O. S. $-\frac{1}{10}$ s.	20/xx		O. S. $-\frac{1}{18}$ s. or $-\frac{1}{20}$ s.	20/xx	
32	12	120 "	O. D. $+\frac{1}{30}$ s.	15/xvi ?	5 "	O. D. $+\frac{1}{24}$ s.	15/xvi ?	Atr. correction 2 mos. later.
			O. S. $+\frac{1}{30}$ s.	15/xvi		O. S. $+\frac{1}{24}$ s.	15/xvi ?	
33	9	72 "	O. D. $+\frac{1}{7}$ s. ○ $+\frac{1}{24}$ c. ax. 30°..	20/xl ?	3 "	O. D. $+\frac{1}{7}$ s. ○ $+\frac{1}{24}$ c. ax. 60°....	20/lxx	Amblyopia; former strabismus.
			O. S. $+\frac{1}{18}$ s. ○ $+\frac{1}{24}$ c. ax. 150°	...		O. S. $+\frac{1}{18}$ s. ○ $+\frac{1}{24}$ c. ax. 150°..	10/cc	Atr. correction 2 yrs. before.
34	19	24 "	O. D. $-\frac{1}{12}$ c. ax. 180 ⌊ ○ $+\frac{1}{48}$ c. ax. 90°.....	20/xvi ?	3 "	O. D. $+\frac{1}{18}$ c. ax. 90°.....	20/xx	Commencing myopia.
			O. S. $-\frac{1}{12}$ s.	20/xx		O. S. $-\frac{1}{60}$ c. ax. 60°.....	20/xx	Atr. correction 2 yrs. before.
35	53	96 "	O. D. $+\frac{1}{12}$ c. ax. 30 ⌊ ○ $-\frac{1}{12}$ c. ax. 120°.....	20/xx ? ?	3 "	O. D. $+\frac{1}{12}$ c. ax. 30 ⌊ ○ $-\frac{1}{12}$ c. ax. 120°.....	20/xx	Atr. immediately after hom.
			O. S. $+\frac{1}{12}$ s.	20/xx		O. S. $-\frac{1}{12}$ c. ax. 60°.....	20/xx	

TABLE V.—A COMPARISON OF HOMATROPINE AND DUBOISINE IN THE SAME CASES.

No.	Age.	Homatropine used.	Formula of Correction.	Vision.	Duboisine used.	Formula of Correction.	Vision.	Remarks.
1	43	24 hours.	O. D. $+\frac{1}{24}$ s. ○ $+\frac{1}{60}$ c. ax. 120°	20/xxv ?	1 day.	O. D. $+\frac{1}{24}$ s. ○ $+\frac{1}{60}$ c. ax. 120°..	20/xx ?	Dubois. immediately after hom.
			O. S. $+\frac{1}{24}$ s. ○ $+\frac{1}{48}$ c. ax. 60°..	20/xx ?		O. S. $+\frac{1}{24}$ s. ○ $+\frac{1}{48}$ c. ax. 60°....	20/xx ?	
2	13	2 "	O. D. $+\frac{1}{12}$ c. ax. 120°.....	20/xx ? ?	2 days.	O. D. $+\frac{1}{48}$ s. ○ $+\frac{1}{12}$ c. ax. 120°..	20/xx ?	Dubois. immediately after hom.
			O. S. $+\frac{1}{24}$ s. ○ $+\frac{1}{18}$ c. ax. 90°..	20/l		O. S. $+\frac{1}{24}$ s. ○ $+\frac{1}{18}$ c. ax. 105°..	20/l	
3	23	8 "	O. D. Em.....	20/xx	3 "	O. D. Em.....	20/xx	Neuro-retinitis?
			O. S. Em.....	20/xx		O. S. Em.....	20/xx ?	Dubois. 2 mos. before hom.

TABLE V.—A COMPARISON OF HOMATROPINE AND DUBOISINE IN THE SAME CASES.—*Continued.*

No.	Age.	Homatropine used.	Formula of Correction.	Vision.	Duboisine used.	Formula of Correction.	Vision.	Remarks.
4	20	2 hours.	O. D.—$\frac{1}{0.5}$ s. O. S.—$\frac{1}{9}$ ○—$\frac{1}{18}$ c. ax. 180°	$\frac{20}{XXX}$? $\frac{20}{XXV}$?	1 day.	O. D.—$\frac{1}{0.5}$ s. (or —$\frac{1}{7}$) ○—$\frac{1}{60}$ c. ax. 180° O. S.—$\frac{1}{9}$ s. (or —$\frac{1}{70}$ s.) ○—$\frac{1}{72}$ c. ax.	$\frac{20}{XXX}$? $\frac{20}{XXX}$	Dubois. immediately after hom.
5	28	24 “	O. D.+$\frac{1}{30}$ s. O. S.+$\frac{1}{36}$ s. ○+$\frac{1}{72}$ c. ax. 90°	$\frac{20}{XX}$ $\frac{20}{XX}$	1 “	O. D.+$\frac{1}{24}$ s. O. S.+$\frac{1}{30}$ s. ○+$\frac{1}{60}$ c. ax. 90°	$\frac{20}{XX}$ $\frac{20}{XX}$	Dubois. immediately after hom.
6	19	1 hour.	O. D.+$\frac{1}{72}$ c. (or+$\frac{1}{60}$ c.) ax. 90° (? O. S.+$\frac{1}{72}$ c. (or+$\frac{1}{60}$ c) ax. 90° (?	$\frac{20}{XX}$ $\frac{20}{XX}$	1 “	O. D.+$\frac{1}{36}$ s. ○+$\frac{1}{60}$ c. ax. 90° O. S.+$\frac{1}{36}$ s. ○+$\frac{1}{72}$ c. ax. 90°	$\frac{20}{XX}$ $\frac{20}{XX}$	Dubois. immediately after hom. Insuf. of Interni and spasm of A.
7	24	7 hours.	O. D.+$\frac{1}{60}$ c. ax. 75° O. S.+$\frac{1}{72}$ c. ax. 90°	$\frac{20}{XX}$ $\frac{20}{XX}$	1 “	O. D.+$\frac{1}{72}$ c. ax. 105° O. S.+$\frac{1}{72}$ ax. 100°	$\frac{20}{XX}$ $\frac{20}{XX}$	Dubois. immediately after hom.
8	25	1 hour.	O. D.+$\frac{1}{48}$ c. ax. 90° O. S.+$\frac{1}{48}$ c. ax. 90°	....	7 days.	O. D.+$\frac{1}{60}$ c. ax. 105° O. S.+$\frac{1}{60}$ c. ax. 75°	$\frac{20}{XXV}$ $\frac{20}{XX}$?	Dubois. immediately after hom.
9	26	1½ “	O. D.+$\frac{1}{60}$ c. ax. 75° O. S.+$\frac{1}{60}$ c. ax. 105°	$\frac{20}{XXV}$ + $\frac{20}{XX}$	1 day.	O. D.+$\frac{1}{60}$ s. ○+$\frac{1}{60}$ c. ax. 75° O. S.+$\frac{1}{48}$ s.	$\frac{20}{XX}$	Dubois. immediately after hom.
10	19	24 hours.	O. D.—$\frac{1}{36}$ c. ax. 180 ⌊ ○+$\frac{1}{36}$ c. ax. 90° O. S.+$\frac{1}{30}$ c. ax. 90°	$\frac{20}{XX}$ $\frac{20}{XX}$	3 days.	O. D.—$\frac{1}{36}$ c. ax. 180 ⌊ ○+$\frac{1}{36}$ c. ax. 90° O. S.+$\frac{1}{36}$ c. ax. 90°	$\frac{20}{XX}$? $\frac{20}{XX}$	Dubois. 1 year previous.
11	39	72 “	O. D.+$\frac{1}{18}$ s. O. S.+$\frac{1}{72}$ s. or +$\frac{1}{24}$ s. ○+$\frac{1}{72}$ c. ax. 180°	$\frac{20}{XX}$	1 day.	O. D.+$\frac{1}{18}$ s. ○+$\frac{1}{72}$ c. ax. 90° O. S.+$1\frac{1}{2}$ s. (○+$\frac{1}{72}$ c. ax. 90° ?)	$\frac{20}{XX}$ + $\frac{20}{XXV}$?	Dubois. immediately after hom.
12	18	24 “	O. D.+$\frac{1}{42}$ s. O. S.+$\frac{1}{42}$ s.	$\frac{20}{XX}$ $\frac{20}{XX}$	1 “	O. D.+$\frac{1}{42}$ s. O. S.+$\frac{1}{42}$ s.	$\frac{20}{XX}$ $\frac{20}{XX}$	Dubois. immediately after hom.

13	38	24 hours.	O. D. $+\frac{1}{30}$ s. ○ $+\frac{1}{30}$ c. ax. 105° O. S. $+\frac{1}{24}$ s. ○ $+\frac{1}{48}$ c. ax. 75°..	20/XX 20/XX	8 days.	O. D. $+\frac{1}{30}$ s. ○ $+\frac{1}{30}$ c. ax. 105°... O. S. $+\frac{1}{24}$ s. ○ $+\frac{1}{60}$ c. ax. 75°....	20/XX 20/XX	Dubois. correction 10 mos. before.
14	41	24 "	O. D. $+\frac{1}{30}$ s..... O. S. $+\frac{1}{30}$ s. ○ $+\frac{1}{60}$ c. ax. 120°..	20/XX? 20/XX	1 day.	O. D. $+\frac{1}{30}$ s. or $+\frac{1}{24}$ s..... O. S. $+\frac{1}{48}$ s. ○ $+\frac{1}{72}$ s. or $+\frac{1}{30}$ s. = $+\frac{1}{60}$ c. ax. 120°.....	20/XXV	Dubois. immediately after hom. Latter far more annoying.
15	33	26 "	O. D. $-\frac{1}{60}$ c. ax. 165°..... O. S. $-\frac{1}{60}$ c. ax. 75°.....	20/XX 20/XX?	1 "	O. D. $-\frac{1}{72}$ c. ax. 165°..... O. S. $-\frac{1}{60}$ c. ax. 75°.....	20/XX 20/XX	Dubois. immediately after hom. Latter far more annoying.
16	18	120 "	O. D. $-\frac{1}{10}$ s. ○ $-\frac{1}{72}$ c. ax. 170° O. S. $-\frac{1}{7}$ s. ○ $-\frac{1}{60}$ c. ax. 10°..	20/XX 20/XX	4 days.	O. D. $-\frac{1}{10}$ s. ○ $-\frac{1}{72}$ c. ax. 180°... O. S. $-\frac{1}{8}$ $(-\frac{1}{7.3})$ ○ $-\frac{1}{60}$ c. ax. 180°	20/XX 20/XX??	Dubois. correction 2 yrs. before. Progressive myopia.
17	22	100 "	O. D. $+\frac{1}{72}$ s. ○ $+\frac{1}{72}$ c. ax. 105° O. S. $+\frac{1}{72}$ s. ○ $+\frac{1}{72}$ c. ax. 105°	20/XX 20/XX	4 "	O. D. $+\frac{1}{72}$ s. ○ $+\frac{1}{72}$ c. ax. 105°... O. S. $+\frac{1}{60}$ s. or $+\frac{1}{72}$ s.....	20/XX? 20/XX??	Dubois. correction 7 mos. before.
18	26	72 "	O. D. $+\frac{1}{72}$ s. ○ $+\frac{1}{72}$ c. ax. 105° O. S. $+\frac{1}{48}$ c. ax. 75°.....	20/XX 20/XX	2 "	O. D. $+\frac{1}{48}$ c. ax. 90°..... O. S. $+\frac{1}{30}$ c. ax. 90°.....	20/XX? 20/XX	Dubois. correction 6 mos before.
19	34	24 "	O. D. $-\frac{1}{48}$ s. ○ $-\frac{1}{48}$ c. ax. 125° O. S. $-\frac{1}{72}$ s.....	20/XX+ 20/XX+	4 "	O. D. $-\frac{1}{30}$ s. ○ $-\frac{1}{72}$ c. ax. 120°.. O. S. $-\frac{1}{60}$ s.....	20/XXX? 20/XXV?	Accommodative retinitis. Hom. immediately after dubois.

TABLE VI.—A COMPARISON OF HYOSCYAMINE AND ATROPINE IN THE SAME CASES.

No.	Age.	Hyoscyamine used.	Formula of Correction.	Vision.	Atropine used.	Formula of Correction.	Vision.	Remarks.
1	20	25 hours.	O. D. $+\frac{1}{2\cdot4}$ s. ○ $+\frac{1}{1\cdot4}$ c. ax. 105°..	$\frac{1\cdot5}{XXV}$	2 days.	O. D. $+\frac{1}{2\cdot4}$ s. ○ $+\frac{1}{1\cdot4}$ c. ax. 105°...	$\frac{1\cdot5}{XXV}$	Atr. immediately after hyosc.
			O. S. $+\frac{1}{1\cdot8}$ s. ○ $+\frac{1}{1\cdot6}$ c. ax. 90°..	$\frac{1\cdot5}{I}$		O. S. $+\frac{1}{2\cdot0}$ s. ○ $+\frac{1}{1\cdot4}$ c. ax. 85°....	$\frac{1\cdot5}{XI}$	
2	10	24 "	O. D. $+\frac{1}{3\cdot0}$ s.....	$\frac{1\cdot5}{XXX}$	2 "	O. D. $+\frac{1}{3\cdot0}$ s. ○ $+\frac{1}{0\cdot0}$ c. ax. 90°....	$\frac{1\cdot5}{XVI}$	Atr. immediately after hyosc.
			O. S. $+\frac{1}{3\cdot0}$ s. ○ $+\frac{1}{0\cdot0}$ c. ax. 90°..	$\frac{1\cdot5}{XXX}$		O. S. $+\frac{1}{3\cdot0}$ s. ○ $+\frac{1}{0\cdot0}$ c. ax. 90°....	$\frac{1\cdot5}{XVI}$	
3	16	40 "	O. D. $+\frac{1}{6}$ s. ○ $+\frac{1}{3\cdot6}$ c. ax. 120°..	$\frac{2\cdot0}{XX}$	2 "	O. D. $+\frac{1}{6}$ s. ○ $+\frac{1}{4\cdot8}$ c. ax. 70°.....	$\frac{2\cdot0}{XX}$	Atr. correction 6 years before.
			O. S. $+\frac{1}{5\cdot5}$ ○ $+\frac{1}{3\cdot6}$ c. ax. 90°...	$\frac{2\cdot0}{XX}$		O. S. $+\frac{1}{6}$ s. ○ $+\frac{1}{4\cdot8}$ c. ax. 120°....	$\frac{2\cdot0}{XX}$	
4	17	170 "	O. D. $+\frac{1}{0\cdot0}$ c. or $+\frac{1}{7\cdot2}$ c. ax. 90°.	$\frac{2\cdot0}{XVI}$?	21 "	O. D. $+\frac{1}{7\cdot2}$ s. ○ $+\frac{1}{7\cdot2}$ c. ax. 90°....	$\frac{2\cdot0}{XVI}$	Marked choroido-ret. irrit.
			O. S. $+\frac{1}{4\cdot8}$ s. (As. < $+\frac{1}{7\cdot2}$ c.)....	$\frac{2\cdot0}{XX}$ +		O. S. $+\frac{1}{0\cdot0}$ s. ○ $+\frac{1}{7\cdot2}$ c. ax. 90°....	$\frac{2\cdot0}{XVI}$	Atropine 2 weeks later.
5	30	48 "	O. D. $+\frac{1}{0\cdot0}$.....	$\frac{1\cdot5}{XVI}$	1 day.	O. D. $+\frac{1}{0\cdot0}$.....	$\frac{1\cdot5}{XVI}$	Atr. immediately after hyosc.
			O. S. ——.....	...		O. S. ——.....	...	
6	21	1 hour.	O. D. $+\frac{1}{1\cdot4}$ s. ○ $+\frac{1}{4\cdot8}$ c. ax. 90° ..	$\frac{1\cdot5}{XVI}$	2 days.	O. D. $+\frac{1}{1\cdot2}$ s. ○ $+\frac{1}{0\cdot0}$ c. ax. 75°....	$\frac{1\cdot5}{XVI}$	Atr. immediately after hyosc.
			O. S. $+\frac{1}{1\cdot0}$ s. ○ $+\frac{1}{3\cdot0}$ c. ax. 60° ..	$\frac{1\cdot5}{XXV}$		O. S. $+\frac{1}{1\cdot0}$ ○ $+\frac{1}{4\cdot8}$ c. ax. 60°.....	$\frac{1\cdot5}{XX}$	
7	11	120 hrs.	O. D. $+\frac{1}{8}$ s.....	$\frac{1\cdot5}{XX}$	2 "	O. D. $+\frac{1}{5\cdot5}$ s.	$\frac{1\cdot5}{XVI}$	Atr. immediately after hyosc.
			O. S. $+\frac{1}{6}$ s.....	$\frac{1\cdot5}{XX}$		O. S. $+\frac{1}{6\cdot5}$ s.....	$\frac{1\cdot5}{XVI}$	
8	30	48 "	O. D. $+\frac{1}{1\cdot4}$ s. or $+\frac{1}{1\cdot3}$ s.....	$\frac{1\cdot5}{XVI}$	1 day.	O. D. $+\frac{1}{1\cdot3}$ s.....	$\frac{1\cdot5}{XVI}$	Atr. immediately after hyosc.
			O. S. $+\frac{1}{3\cdot6}$ s. ○ $+\frac{1}{0\cdot0}$ c. ax.....	$\frac{1\cdot5}{XXX}$		O. S. $+\frac{1}{3\cdot0}$ s. ○ $+\frac{1}{0\cdot0}$ c. ax. 180°...	$\frac{1\cdot5}{XVI}$	
9	16	120 "	O. D. $+\frac{1}{2\cdot4}$ s.....	$\frac{1\cdot5}{XVI}$	1 "	O. D. $+\frac{1}{2\cdot4}$ s.....	$\frac{1\cdot5}{XVI}$	Atr. immediately after hyosc.
			O. S. $+\frac{1}{2\cdot0}$ s.....	$\frac{1\cdot5}{XVI}$		O. S. $+\frac{1}{1\cdot8}$ s.....	$\frac{1\cdot5}{XVI}$	

10	12	48 hours.	O. D. $+\frac{1}{30}$ s. ..... O. S. $+\frac{1}{24}$ s.	$\frac{15}{XVI}$ $\frac{15}{XVI}$	1 day.	O. D. $+\frac{1}{30}$ s. ..... O. S. $+\frac{1}{30}$ s. ○ $+\frac{1}{60}$ c. ax. 90°	$\frac{15}{XVI}$ $\frac{15}{XVI}$	Atr. immediately after hyosc.
11	13	24 "	O D. $+\frac{1}{30}$ s. ..... O. S. $+\frac{1}{72}$ s. ○ $+\frac{1}{60}$ c. ax. 90°..	$\frac{15}{XVI}$ $\frac{15}{XVI}$	4 days.	O. D. $+\frac{1}{30}$ s. ..... O. S. $+\frac{1}{72}$ s. ○ $+\frac{1}{60}$ c. ax. 90°....	$\frac{15}{XVI}$ $\frac{15}{XVI}$	Atr. immediately after hyosc.
12	24	48 "	O. D. $-\frac{1}{36}$ s. ○ $-\frac{1}{6}$ c. ax. 15°... O. S. $-\frac{1}{18}$ s.	$\frac{20}{XXV}$ $\frac{20}{XXV}$	....	O. D. $-\frac{1}{30}$ s. ○ $-\frac{1}{6}$ c. ax. 10°..... O. S. $-\frac{1}{18}$ s.	... ...	Atr. correction 2 years before by another.
13	43	60 "	O. D. $+\frac{1}{60}$ s. ○ $+\frac{1}{60}$ c. ax. 90°.. O. S. $+\frac{1}{60}$ s. ○ $+\frac{1}{60}$ c. ax. 90°...	$\frac{15}{XX}$? $\frac{15}{XX}$?	2½ "	O. D. $+\frac{1}{60}$ s. ○ $+\frac{1}{60}$ c. ax. 105°... O. S. $+\frac{1}{60}$ s. ○ $+\frac{1}{60}$ c. ax. 75°....	... ...	Atr. correction 2 years before.
14	11	120 " ?	O. D. $-\frac{1}{30}$ s. ○ $-\frac{1}{30}$ c. ax. 20°.. O. S. $-\frac{1}{20}$ s. ○ $-\frac{1}{72}$ c. ax. 160°..	$\frac{20}{XI}$? $\frac{20}{IXX}$ +	3 "	O. D. $-\frac{1}{30}$ s. ○ $-\frac{1}{30}$ c. ax. 20°.... O. S. $-\frac{1}{30}$ s. ○ $-\frac{1}{36}$ c. ax. 160°...	$\frac{20}{IXIV}$ $\frac{20}{IXIV}$	Atr. correction 2 years before. Progressive myopia.
15	19	140 "	O. D. $-\frac{1}{72}$ ax. 170 L ○ $+\frac{1}{48}$ c. ax. 80 ..... O. S. $-\frac{1}{72}$ ax. 60°.....	$\frac{20}{XX}$ + $\frac{20}{XX}$ +	3 "	O. D. $+\frac{1}{48}$ c. ax. 90°..... O. S. $-\frac{1}{60}$ c. ax. 60°	$\frac{20}{XX}$ $\frac{20}{XX}$	Progressive myopia. Progressive myopia.

TABLE VII.—A COMPARISON OF HYOSCYAMINE AND DUBOISINE IN THE SAME CASES.

No.	Age.	Hyoscyamine used.	Formula of Correction.	Vision.	Duboisine used.	Formula of Correction.	Vision.	Remarks.
1	25	96 hours.	O. D. $-\frac{1}{24}$ s. ○ $-\frac{1}{60}$ c. ax. 150°. O. S. $-\frac{1}{30}$ s. ○ $-\frac{1}{24}$ c ax. 20°..	$\frac{20}{XX}$?? $\frac{20}{XX}$?	10 days.	O. D. $-\frac{1}{24}$ s. ○ $-\frac{1}{48}$ c. ax. 160°.. O. S. $-\frac{1}{24}$ s. ○ $-\frac{1}{30}$ c. ax. 20°...	$\frac{20}{XX}$? $\frac{20}{XXX}$	Spasm of accommodation. Dubois. correction 1 year before.
2	32	120 "	O. D. ——..... ..... O. S. $-\frac{1}{72}$ s. ○ $+\frac{1}{24}$ c. ax. 90°..	... $\frac{20}{XVI}$	3 "	O. D. —— ..... O. S. $-\frac{1}{72}$ s. ○ $+\frac{1}{24}$ c. ax. 90°....	... $\frac{20}{XX}$	Spasm of accommodation. Dubois. correction previous.
3	37	120 "	O. D. $+\frac{1}{48}$ s. ○ $+\frac{1}{48}$ c. ax. 150°. O. S. $+\frac{1}{72}$ s. ○ $+\frac{1}{60}$ c. ax. 135°.	$\frac{20}{XX}$ $\frac{20}{XX}$	13 "	O. D. $+\frac{1}{48}$ s. ○ $+\frac{1}{60}$ c. ax. 105°.. O. S. $+\frac{1}{48}$ c. ○ $+\frac{1}{60}$ c. ax. 105°..	$\frac{20}{XX}$ $\frac{20}{XX}$	Blennorrhœa of lach. sac. Hyosc. 3 mcs. after dubois.

TABLE VIII.—A COMPARISON OF HOMATROPINE AND HYOSCYAMINE IN THE SAME CASES.

No.	Age.	Homatropine used.	Formula of Correction.	Vision.	Hyoscyamine used.	Formula of Correction.	Vision.	Remarks.
1	22	40 hours.	O. D. $+\frac{1}{30}$ s. ○ $+\frac{1}{30}$ c. ax. 90°..	20/xx ? ?	1½ hour.	O. D. $+\frac{1}{30}$ s. ○ $+\frac{1}{30}$ c. ax. 90°...	20/xx ?	Hyosc. immediately following.
			O. S. $+\frac{1}{72}$ s. ○ $+\frac{1}{24}$ c. ax. 90°..	20/xx ? ?		O. S. $+\frac{1}{72}$ s. ○ $+\frac{1}{24}$ c. ax. 90°....	20/xx ?	
2	18	24 "	O. D. $-\frac{1}{72}$ c. ax. 180° ⌊ ○ $+\frac{1}{48}$ c. ax. 90°.....	20/xvi ?	6 days.	O. D. $-\frac{1}{72}$ c. ax. 170 ⌊ ○ $+\frac{1}{48}$ c. ax. 80°.....	20/xx +	Hom. 3 mos. before hyosc.
			O. S. $-\frac{1}{72}$ s.....	20/xx		O. S. $-\frac{1}{72}$ c. ax. 60°.....	20/xx +	

TABLE IX.—DUBOISINE WAS USED IN COMPARISON:

With atropine in 32 eyes—appearing superior in 7, equal in 12, inferior in 9 (2 ?); having been immediately followed in 1.

HOMATROPINE WAS USED IN COMPARISON:

With atropine in 70 eyes—appearing superior in 14, equal in 23, inferior in 22; having been immediately followed in 38.
With duboisine in 38 eyes—appearing superior in 8, equal in 18, inferior in 11; having been immediately followed in 24.
With hyoscyamine in 4 eyes—appearing superior in 0, equal in 3, inferior in 1; having been immediately followed in 2.

HYOSCYAMINE WAS USED IN COMPARISON:

With atropine in 29 eyes—appearing superior in 4, equal in 13, inferior in 10; having been immediately followed in 17.
With duboisine in 5 eyes—appearing superior in 4, equal in 1, inferior in 0.
With homatropine in 4 eyes—appearing superior in 1, equal in 3, inferior in 0.

REMARKS.

DR. JOHN GREEN, of St. Louis, asked concerning the relative frequency of the occurrence of conjunctival inflammation while experimenting with these drugs.

DR. RISLEY replied that in not a single case did it occur. The atropia caused a slight smarting on the second day, if not on the first, in some cases. In one or two instances where duboisia was used he had seen the eye get red, but all that was required to arrest the disturbance was to touch it lightly with a crystal of alum.

DR. GREEN said that in the class of cases which he met with he was compelled to forego the use of atropia, because of its producing distinct conjunctival inflammation, and sometimes quite severe. He had hoped that with the introduction of new mydriatics some agent would be discovered which could be used without the risk of such complication, but he had not found any such satisfaction. He recalled one case, that of an old man upon whom he operated for cataract, and used atropia without irritation, but two weeks afterward a single application of atropia started up an attack of inflammation, which continued for a number of days. He had not found any advantage from using daturia, and latterly he had employed duboisia, but it had given rise to some trouble. Certainly he met with cases in practice where there was a tolerance of such mydriatics up to a certain point, beyond which they could be no longer used on account of the conjunctivitis which they set up. He asked whether any of the members had had a similar experience.

DR. FRANCIS B. LORING, of Washington, D. C., said that in that city it had become necessary to use mydriatics the effects of which passed away rapidly, and on account of that fact he had had considerable experience in the use of duboisia and homatropia, neither of which, however, could be used in Washington during hot weather. Why they produced the irritation he did not know. To correct the tendency, the addition of sulphate of zinc, as suggested by Prof. Seely had yielded very good results. He had also found that nitrate of silver could not be used in Washington during hot weather.

DR. GREEN said that in his cases the addition of sulphate of zinc had not done any good. In hot weather in St. Louis also he had been obliged to be very cautious in using a mydriatic in a child's eyes, unless he could keep the patient sitting where it was cool for one or two hours. Such results, however, were not common in cold weather.

DR. S. THEOBALD, of Baltimore, had seen one or two cases in which slight inflammation had been set up after atropia had been used for a long time. In those cases he had used duboisia instead, and with good results. He referred to a case where a four-grain solution of atropia had been used four times a day for a week, and yet the pupil did not yield; but, as the irritation did not subside, he substituted a four-grain solution of duboisia, and within two hours the pupil di-

lated promptly, and by continuing its use all the adhesions were made to yield.

DR. WM. F. NORRIS, of Philadelphia, had used with great satisfaction the sulphate of hyoscyamine, and could corroborate all that Dr. Risley had said concerning its power to produce complete paresis of accommodation, and its calming effect upon the iris, choroid, and retina. He had not had sufficient experience in the use of the sulphate of daturia in inflammatory cases to enable him to speak positively, but he regarded it as a very good mydriatic for determining the refraction of the eye, the only objection being the time it holds on. He had not seen conjunctival irritation produced by it. He was surprised to hear that conjunctivitis had been caused by these mydriatics so frequently. He thought that he had not seen more than a half-dozen cases.

DR. W. S. LITTLE thought that Philadelphia was remarkably free from catarrhal affections of the conjunctiva, irrespective of agents employed in treatment. At least there was a very marked difference in that respect between Philadelphia and New York, and he had attributed it to the isolation of families in Philadelphia, whereas in New York all the poorer classes lived in tenement-houses. He had used atropia and duboisia quite extensively, but had not seen the catarrhal symptoms mentioned by Dr. Green produced by it.

DR. ROOSA asked Dr. Little if the difference which he had mentioned as existing between Philadelphia and New York held good with regard to phlyctenular conjunctivitis and keratitis, which formed a large proportion of cases a tout-door clinics.

DR LITTLE said there was no difference in that respect.

DR. E. W. BARTLETT, of Milwaukee, Wis., said that at one time many cases of catarrhal inflammation of the conjunctiva were seen in that city, but on investigation it was found that the atropia which had been and was being used was insoluble without the addition of something. Merck's atropine was then obtained, and since the use of that preparation the catarrhal trouble had disappeared. His impression was that many unfavorable results were due to impure drugs.

DR. GREEN said that no such influence was exerted in his cases, for he had taken special pains to secure pure drugs.

DR. S. C. AYRES, of Cincinnati, said that he had used homatropia for a number of months in the examination of refraction, and had found it very satisfactory. He had seldom seen conjunctival irritation from its use; but there was one point worthy of mention, and that was that the solution should be freshly prepared every two or three days, because it was liable to decompose or degenerate in some way so as not to be reliable. His results in its use had been satisfactory, accommodation returning usually within twenty-four hours. He had not seen cases in which its effects had been so prolonged as in those mentioned by Dr. Risley. Perhaps that had arisen from the fact that he had not taken the trouble to examine the patients for several days after its use.

DR. O. F. WADSWORTH, of Boston, said that catarrhal conjunctivi-

tis occurred in that city, but he had rarely seen any trouble from the use of mydriatics, even though they were continued for a long time.

With regard to the freshness of the solution of homatropia spoken of by Dr. Ayres, it had not seemed to him that such degeneration occurred in all preparations; for a friend of his brought him a solution which he obtained in Breslau, and he used it until more of the drug could be obtained here. But a small quantity remained in the phial, and within two or three weeks he used it and obtained just as prompt effect upon the pupil as when he first received the solution made nearly a year before. With regard to duboisia, the symptom of dizziness had not been mentioned so prominently as he could have expected. In these instances, certainly, when he had taken pains to use a small quantity—not more than one-third of a minim of a one per cent. solution—there was distinct and troublesome vertigo.

DR. THEOBALD, of Baltimore, referred to a case in which he used two drops of a four-grain solution of duboisia in each eye, and the result was complete paresis and delirium, which lasted for several hours.

THE PRESIDENT had seen a case in which the unpleasant effects of duboisia, almost precisely parallel with those mentioned by Dr. Theobald, were produced in a person with whom atropine had disagreed, and there was also iritic and conjunctival irritation. The ill-effects of duboisia were produced within twenty minutes, and were rather alarming. There was one point which had not been brought out by the discussion. He had been led to attach a good deal of importance to persistent spasm of the ciliary muscle in many ametropic eyes—a spasm which did not yield to the ordinary use of atropine, and which he had found was more obstinate than he had formerly been led to think. Many of his corrections, made in the usual way, and with the usual precautions and with the usual mydriatics, had subsequently been proved to be incorrect. He had therefore grown to be far more critical in testing for total paralysis than formerly. He had been compelled in many cases to use atropine two, three, or four weeks, and produce toxic symptoms, in order to get the necessary effect upon the eye. With regard to homatropia, he had been led to think that it had only a fleeting and partial control over accommodation. He wished to suggest to the members that tough spasm of accommodation was a very common occurrence.

TWO CASES OF SARCOMA OF THE CHOROID, PRESENTING UNUSUAL CLINICAL FEATURES.

By CHARLES J. KIPP, M.D.,

NEWARK, N. J.

CASE I.—Mrs. J. F., aged forty-four, a large, robust-looking woman, consulted me in November, 1873, for blindness of her left eye. She stated that for the past four months she had noticed gradual failure of sight in this eye; that the eye had never been inflamed, and had never given her any pain. Subsequently, I learned that she had often been beaten on the head by her husband, but she did not remember to have ever been struck on the eye. On examination, it was found that she had only perception of light in this eye. Tn. The anterior parts of the eye were perfectly normal, and the motility of the eye was unimpaired in all directions. On looking into the eye with the ophthalmoscope, attention was at once drawn to a hemispherical tumor which projected from the nasal half of the sclerotic into the vitreous chamber, nearly to the visual axis. Anteriorly the base of the tumor reached apparently to the periphery of the choroid. The tumor was of a yellowish red color, and perfectly smooth, velvety surface. It was covered by the transparent retina, which was in immediate contact with it everywhere, except at the lower anterior junction of the tumor and the choroid, where it was detached. The retinal vessels were plainly visible on the tumor, and were of normal size and color. The disc could not be seen on account of the tumor. The outer half of the fundus presented nothing abnormal. In the lower part of the eye there was a shallow detachment of the retina. The anterior part of the tumor was also distinctly seen through the dilated pupil in ordinary daylight, and was repeatedly examined by me with sunlight, in the hope of discovering choroidal vessels on its surface, which I, however, failed to find. Viewed by daylight, the tumor was of a uniform pinkish color. I kept the patient under observation for some weeks, but failed to notice during this time evidences of growth in the tumor, or other changes in the eye. Since then I have lost sight of the patient.

CASE II.—Mrs. E. C., a very fleshy English woman, aged forty-six, the mother of eleven children (five of whom are deaf-mutes), consulted me in the middle of June of this year, with regard to her left eye. She stated that this eye was blind, and that she was greatly worried by a constant "fluttering" before it. Her parents and grandparents were healthy people, who died at a good old age. She is hysterical, but otherwise in good health. Her attention was first drawn to this eye seventeen years ago, when she noticed black specks floating before it, which have remained ever since. Her sight has been impaired for some years, but during the last year this impairment has greatly increased. She can now recognize very large letters only when held to the left, and very close to the eye. Since three or four weeks she has noticed a constant "working" or "fluttering" in this eye, which has greatly alarmed her. When asked as to what this peculiar sensation resembled, she compared it to muscular twitchings. She had no pain in this eye, and was sure that it had never been hurt.

On examination, it was found that should count fingers only in the left half of the visual field. Tension was normal. The anterior half of the eye was apparently perfectly healthy; the pupil was of the same size as that of the other eye, and responded readily to light. The ophthalmoscope revealed a hemispherical tumor which projected from the temporal half of the sclerotic nearly to the visual axis. The tumor was of a yellowish red color, with here and there spots of darker color; it was perfectly smooth and closely covered as far as visible by the slightly hazy retina. The retinal vessels over the tumor presented nothing abnormal. Anteriorly the tumor extended apparently close to the ciliary body, and upward and downward, about half way between the horizontal and vertical meridians. The vitreous was slightly hazy. The disc was somewhat veiled, but otherwise normal. The retina in the nasal half presented nothing abnormal, whereas in the lower part of the eye it was detached, but transparent. In this, as in Case No. 1, the tumor could be seen through the dilated pupil in daylight, and appeared then of a pinkish color. Examination with oblique illumination and magnifying-glasses failed to reveal any vessels beneath the retina covering the tumor.

The patient was seen every few days for several weeks, during which time the eye underwent no change.

From this description it will be seen *that the eye presented all the ophthalmoscopic symptoms of detachment of the choroid*, as described by v. Graefe (*Archiv für Ophthalmologie*, Bd. iv., 2, p. 227); Knapp

("Die Intraoculären Geschwülste," p. 200); Liebreich (*Archiv f. Ophthalmologie*, Bd. v., 2, p. 259); Schweigger ("Handbuch d. Augenheilkunde," p. 454); and Wecker (Graefe-Saemisch "Handbuch d. Augenheilkunde," Bd. iv., p. 662). The cases described by v. Graefe and by Liebreich were in every particular like the above. One symptom was, however, absent in my case, which Wecker considers of the greatest importance in the differential diagnosis between detachment of the choroid and intra-ocular tumor—great diminution of tension. In the cases above reported the tension was neither diminished nor increased in comparison with the healthy fellow eye.

On the other hand, the cases here reported were unlike the great majority of large choroidal tumors, in this that the detachment of the retina was quite limited, and that, notwithstanding the large size of the tumor, the eye exhibited no symptom of secondary glaucoma.

Although I felt confident that the eye contained a choroidal neoplasm, I proposed to the patient to make an exploratory incision in the sclerotic, and, if my diagnosis should be found to be correct, to enucleate the globe. Consent having been given, and the patient being under the influence of ether, I made a meridional incision in the conjunctiva over the middle of the insertion of the tendon of the rectus externus, detached this tendon, and made a meridional incision in the sclerotic, commencing at the middle of the insertion of the tendon, and extending 1 ctm. backward. On separating the edges of this incision with two small foreign-body hooks (Knapp's), used as retractors, a dark-colored gelatinous mass of about the size of a French bean protruded, and was cut off with scissors. Further examination showed the tumor to extend beyond either end of the incision. The diagnosis having been thus confirmed, I enucleated the eye in the usual manner. The operation was not followed by any reaction, and the patient was discharged from the hospital six days after the operation. As yet there are no signs of a relapse.

The anatomical examination of the eye showed a large tumor, of an irregularly round form, situated in the choroid; its base extending from the orbiculus ciliaris to a little beyond the macula lutea and about 1 ctm. above and below the horizontal meridian. The tumor was of a yellowish red color in its anterior half, and of a darker hue posteriorly. Its surface was perfectly smooth and velvety, and was covered smoothly by the retina everywhere except at its base, anteriorly and posteriorly when this membrane was slightly detached. With the exception of a shallow detachment of the retina in the lower part, the eye presented no other abnormity.

Examined microscopically, the tumor was found to be a very vascular, melanotic sarcoma, composed chiefly of spindle-shaped cells. This tumor had doubtless started from the outer layers of the choroid, as the chorio-capillaris was preserved, in part at least, everywhere except at the summit of the tumor. At this point the lamina elastica was the only part of the choroid remaining. The elastic lamina was over some parts of the tumor much thickened by "colloid" substance. The pigment-epithelium was proliferous. Of the lamina fusca nothing could be discovered in the region of the tumor. The retina was but loosely attached to the tumor, except at its summit, where the retina was more closely connected with the lamina elastica. The retina over the tumor presented the condition usually described as œdema retinæ. The layer of rods and cones had entirely disappeared, and pigment-deposits were scattered through the outer layers. The tumor had not invaded the sclerotic. Beyond the region of the tumor the choroid and the retina presented nothing abnormal. The optic nerve was healthy.

Remarks.

Dr. John Green, of St. Louis, had seen choroidal sarcoma quite large, with but little detachment except in immediate connection with the tumor. The tumor started from the anterior portion of the choroid, it was true, but it had projected beyond the anterior axis of the eye. It had cut off central vision, but lateral vision remained. He had also seen a case in which, at the time of the enucleation, the tumor was quite large, occupying nearly one-half of the vitreous. And although there was considerable detachment of the retina, such detachment did not exist early.

Dr. J. F. Noyes, of Detroit, Michigan, referred to a case as follows: Some years ago, he had a case similar to one reported by Dr. Kipp. In that case there was considerable detachment of the retina—so much so as to shut off the passage of light into the eye almost altogether. He detected a sarcoma after having drawn off the subretinal fluid with a hypodermic syringe. The retina fell out of the way so that he could look in and see a bluish prominence. He suspected the existence of a malignant growth, but was unable to get the consent of the patient to enucleate the eye until some months afterward, when loss of sight recurred from reaccumulation of fluid and pushing the retina forward. The operation was then performed, and the tumor mentioned was found, which was as large as a large-sized pea, and grew from the posterior portion of the fundus, perhaps one-fourth of an inch to the outside of the optic nerve. It was a spindle-celled sarcoma.

Dr. Green suggested that Dr. Noyes's case was one of local, and not total, separation.

DR. NOYES said that it was so considerable as to shut off the entrance of light into the eye.

DR. GREEN asked concerning the condition of the retina at the examination of the specimen.

DR. NOYES replied that it was nearly, but not totally, separated. As it passed over the tumor it was adherent to it, and immediately upon the sides of the tumor it began to be detached. He was able to trace the retina distinctly over the tumor.

DR. WADSWORTH, of Boston, said that he had examined a choroidal tumor as large as that presented by Dr. Kipp, and there was no detachment of the retina.

DR. KIPP said that the specimen presented did not represent the whole tumor, because a portion was removed when the sclerotic was opened.

The PRESIDENT had seen a choiroidal tumor of considerable size, without detachment of the retina.

A CASE OF SUDDEN AND COMPLETE LOSS OF VISION AFTER LARGE DOSES OF QUININE.

BY F. BULLER, M.D.,

MONTREAL, CANADA.

THE case I am about to relate the details of is, I think, one which should be placed on record first, because few such have as yet found their way into ophthalmic literature; and second, because those that have been described are all, more or less, incomplete; not that I claim for this one a foremost place in regard to completeness; on the contrary, I am painfully aware of many imperfections for which I am myself at least partly to blame, in not having taken more exhaustive notes at the time of its occurrence. I was, however, in a position to observe the order of events from a very early period, until, as I believe, the ultimate result has become manifested, and in so doing it may be that I have supplied some links in the chain of evidence that connects certain morbid conditions of the optic nerves, and certain cases of defective vision, with an antecedent cinchonism.

For obvious reasons we cannot expect to meet with a pure, uncomplicated case of quinine blindness, and it is only by summarizing the features common to each supposed case of the kind that we obtain an accurate clinical picture of the toxic effect of cinchona bark, or its active principles, on the organs of vision. The picture may be said to be still in the artist's studio awaiting the finishing touches essential to its perfection.

On the 27th of August, 1879, I was called in consultation by the medical attendant of a lady recently confined of a healthy child, and now (at that time) affected with a sudden and complete loss of vision. The patient was a highly educated and intelligent woman, about thirty-four years of age, and mother of several children, all of whom were healthy and vigorous.

She had uniformly enjoyed excellent health, though not feeling quite strong since an attack of diphtheria, about a year previously.

Her recent parturition had not been in any way complicated until the fifth day after birth of the child, when symptoms supposed to be indicative of septicæmia set in, and rapidly assumed so grave a character that her medical attendant called another physician in consultation, and it was agreed that she should at once commence taking large doses of quinine.

Two twenty-grain doses were administered in the first twenty-four hours, the same during the second, and the second night she also took thirty or forty grains of chloral, on account of active delirium following intense headache during the day.

The third day she still had high fever, and took three doses of twenty grains each, also a large dose of chloral at night, for the same reason as before.

On the following day the fever and delirium had passed off, but she was found to be absolutely blind. There is some doubt as to whether she could see the day previously; she had been "too much out of her head to remember." I saw her for the first time about one o'clock the same day that the blindness was discovered, and found her condition as follows:

The patient, beyond a feeling of languor and weakness, with slight headache or fulness in the head, described herself as being free from discomfort, but that she was in absolute darkness, and I observed mentally very much depressed. After the first two or three doses of quinine she had experienced a good deal of roaring in the ears and some hardness of hearing, which, however, had passed off, leaving now only a slight tinnitus. Externally the eyes presented nothing abnormal. Conjunctiva of lids and globe neither anæmic nor hyperæmic. Tension and movements of the eyeballs perfectly natural. The pupils were widely dilated, and did not respond perceptibly to the strongest illumination, nor when told to look at the lamp-flame held close to the face; therefore, presumably not to the effort of accommodation. With the lamp in that position there was a faint sensation of light, and when facing the bright sky was conscious of a dim,

diffuse sort of light, though unable to say when the shadow of a hand was passed in front of the eyes.

The refractive media were perfectly normal, and Rf. by ophthalmoscope =E.

The ophthalmoscopic appearances of the fundus, noted at this first examination, were as follows:

L. E.—The papilla presents rather a deep physiological cup, but otherwise has "the roseate hue of health." There is a diffuse bluish gray haziness or turbidity of the retina for a considerable distance in every direction, but most markedly so in the region of the macula, the centre of which by the direct method has the appearance of a cherry-red patch about one line in diameter. There were no retinal hemorrhages, and no choroidal changes anywhere discoverable. The retinal veins, as compared with the arteries, are unusually large, but they are decidedly paler than one commonly meets with in the healthy eye; in other words, the color contrast between the two sets of vessels is a less conspicuous feature than usual. The arteries are entirely normal, except they are, perhaps, actually or relatively somewhat diminished in calibre; arterial pulsation is readily induced by pressure upon the sclerotic. The opacity of the retina nowhere obscures the blood-vessels, and the small branches converging toward the macula are unduly conspicuous. Passing toward the periphery, the retinal cloudiness gradually fades, and at or beyond any point, half-way between the nerve and the ophthalmoscopic periphery, there is no perceptible deviation from physiological conditions.

A most careful examination of the right eye revealed the same changes, though, perhaps, not quite so pronounced as in the left.

The general condition was satisfactory. Temperature and pulse normal and lochia natural; heart, lungs and vascular system presented no abnormality. There was a trace of albumen in the urine, but, as the specimen examined had not been drawn by the catheter, it probably contained some of the lochial discharge.

I was not at that time familiar with the possible effects of large doses of quinine on the organs of vision, but as there seemed no other reasonable explanation of the peculiar phenomena of this case, I expressed the opinion to the attending physician that they were very likely the result of cinchonism, and emphasized the belief, which I still hold, that, however caused, we had to deal with a case of acute retrobulbar neuritis or perineuritis. The urgency of the symptoms seemed to call for active measures. It was, therefore, decided to apply four leeches to each temple and take an additional quantity of

blood by means of Heurteloup's apparatus applied to the leech-bites. Mercurial inunctions, one drachm morning and evening, were also prescribed.

At bedtime, a sixth of a grain of pilocarpine was injected subcutaneously.

Aug. 28th.—*Status idem;* patient exceedingly depressed and despondent, but clear in her mind. Pilocarpine acted fairly on skin; to be repeated at bedtime.

Aug. 29th, at 9 A.M.—Condition unchanged, except that there was not a trace of headache, and the pupils are a trifle less dilated.

At 5 P.M. was able to distinguish bars of light in the Venetian blinds; thought she had seen the nurse passing in front of her several times, and was positive she had seen the dial of a small bedroom clock on the mantle-shelf across the room. She had also caught glimpses of some large letters in a motto hanging on the wall above the clock. Pilocarpine injection repeated at bedtime. I may here mention that there was no lacteal secretion, but that this ultimately became established.

Aug. 30th.—Did not sleep well last night, and is irritated by slight noises, but otherwise feels well. Can now tell the time of day by the small clock across the room, but has great difficulty in finding it. Cannot see the flame of a lamp held close to the face. Can count fingers at ten feet distance, but not at one foot.

Pupils still considerably dilated, but respond slightly to light.

The ophthalmoscope shows a decided diminution in the opacity of the retina.

Aug. 31st.—Vision steadily improving. Can count fingers at any distance from one foot to twenty, or more. Pupils smaller, and react quite distinctly to-night, and in the effort of accommodation can also clearly define the flame of the lamp. She can tell the red and blue letters in the motto across the room.

The retina is fast assuming a normal appearance. The macula, though still redder than normal, does not appear as a sharply defined, red patch, as at first.

September 1st.—Visual area becoming wider at fifteen feet distance. Vision appears to be clear over a space of about one foot in diameter, and indistinct over an area of about two and one-half feet.

Sept. 3d.—Can distinguish all colors in a subdued light, when the blinds are closed, but not when they are open. The retinal opacity is now very slight, but I notice now, for the first time, a marked

diminution in the calibre of the retinal blood-vessels, both arteries and veins, but especially the former. Artificial pulsation can still be elicited by pressure, but not readily.

The optic nerves are both much more pale than normal; if seen for the first time, I should say the case was one of moderately advanced atrophy. Vision about the same as yesterday; she thinks less distinct, if there is any difference; but she looks pale and worn. The mercurial inunctions were omitted yesterday, and small, increasing doses of iodide of potash substituted.

Sept. 4th.—Retinal vessels now very small, certainly not half their normal size; the usual smaller vessels about the discs have nearly all disappeared.

On account of the progressing ischæmia retinæ I performed paracntesis of both anterior chambers and reopened the wounds in the evening. The cornea was anything but anæsthetic.

Sept. 5th.—Thinks vision is improving. Papillæ very pale, and retinal vessels about the same as yesterday. I gave amyl nitrite and watched the result with the ophthalmoscope; it unquestionably diminished the pallor of the nerves, and for the time somewhat increased the size of the arteries. She expressed herself very positively as to the effect, viz., that she could see more clearly after the inhalation.

Sept. 6th.—The field of vision is widening, as proved by the fact that when looking at the opposite wall she can see each corner of the room with both eyes open, though very dimly. Reads Jaeger 8 fluently without glasses. Repeated the amyl inhalation.

Sept. 7th.—The mercurial inunction was continued after the 3d until the present time, and the gums are just beginning to show its effects; has taken 120 grains iodide of potash in the last twenty-four hours; there is slight iodism. (The mercury was not used any more, but the iodide was continued in smaller doses for about a month, and then gradually omitted). There is a faint, but not uniform cloudiness of retina near macula. She is a good deal annoyed by seeing blue and green patches or large spots before the eyes, and also flashes of light.

Sept. 8th.—Reads Jaeger 4 fluently at 18″ distance; each visual field tested roughly with the hand, seems to be about one foot in diameter, and the limitation is about equal in every direction.

The peripheral portions of the retinæ are now slightly cloudy and finely striated. I suppose there is a loss of transparency in the nerve-fibre layer of this part of the retina, possibly overlooked when the

central portions were more conspicuously turbid. The retinal vessels can with difficulty be traced to the ophthalmoscopic periphery. Phosphenes are perfect.

Sept. 21st.--Has used amyl herself once or twice daily, and says she always sees better after the inhalation; concentric limitation of the visual field is now the chief difficulty; has on this account some trouble in getting about; reads Jaeger 2 easily and has no fault to find with distant vision; both retinæ are clear of opacity, and the papillæ are not so pale as they have been; is less annoyed by photopsia or chromatopsia than formerly.

Injections of strychnia were given from September 22d till 28th, but were abandoned on account of inducing headache and "nervousness."

On the first of November I examined the fields of vision on the blackboard, and found each about the same. At 14″ distance that of the left eye measures upward 8″; downward 9½″, inward 8″, outward 12″; beyond these limits there is a zone of very dim, uncertain perception.

Vision = $\frac{2}{3}\frac{0}{0}$. Can distinguish all colors readily at centre only. Although not so much annoyed by chromatopsia, is often greatly distressed by vivid after-images of any object she may happen to have looked at for a few moments. Any circular object, such as a plate, or cup, always looks as if it were spinning round rapidly, so that looking at such objects gives her a sort of giddy sensation. After looking at a picture with a black frame for a few moments, and then turning the eyes away, she sees the picture quite distinctly, but with a strongly luminous gold-colored frame. A room lighted by artificial light looks very dark, except just around the light; she cannot help imagining the gas is bad, and in going about the room has some trouble in avoiding small pieces of furniture.

After November 28th I saw very little of the patient, but was informed from time to time of her continued improvement. She recovered almost her usual health and strength, and was reported as being able to see quite comfortably. On the 28th of June last, that is, after an interval of twenty-two months from the date of last note, I had an opportunity of again examining the eyes, and taking a map of the field of vision of one of them (the left eye) with Carmalt's perimeter. This chart shows the result roughly estimated; the right eye is in a smilar condition.

The outline gives the field for the usual small square of white cardboard, and indicates where it was distinctly seen as such. There is a faint perception for a short distance beyond these limits.

There is a total abolition of all peripheral sense of color, but central color-perception is perfect; at least the small colored squares, red, yellow, green, and blue furnished with Carmalt's perimeter, are all perfectly distinguished at the centre, but not as far as 5° from the centre in the left eye. The right eye has a trifle larger area for color-perception, and a little larger for yellow than for any other color.

Central vision is perfect—$\frac{20}{20}$ with each eye. She has abstained from all unnecessary use of the eyes, but is able to exercise them in near vision without fatigue or inconvenience. The pupils are of medium size, respond to light, and contract during accommodation in a normal manner; the latter is unimpaired. The ophthalmoscopic changes are identical in each eye, and do not differ much from the appearance presented in November, 1879.

The nerves are both pale, but not white. They possess the semi-translucent appearance of health. The formerly deep physiological cup is more shelving, like that of atrophy. Lamina cribrosa fairly distinct. Both arteries and veins are exceedingly small, certainly not more than one-third as large as in the normal condition. The arteries cannot be traced as far as ophthalmoscopic periphery, and some of them have white borders for a short distance. Some of the larger veins, however, are not thus lost. The retina is in other respects entirely normal, and there are no choroidal changes. The subjective sensations of light and the after-images that used to be so troublesome are now only occasionally noticed when tired, or when suffering from "nervous headaches," from which she suffers every three or four weeks, more or less severely, ever since the eyes have been affected.

Darkening the room does not impair her power of reading fine print any more than it does my own, but she is under the impression that between sundown and dark she does not see as well as formerly, or, in other words, the defect of vision is most noticeable at that time of day.

The condition of things has undergone so little change in the past eighteen months that I think we are justified in assuming the final result has been attained.

In looking over the literature of "Quinine blindness," I have not been able to discover any satisfactory explanation of the probable pathological lesions producing such remarkable, and I may even say characteristic intra-ocular changes.

In the first place, the question arises: What is the situation of the

primary lesion—I mean the one which causes the sudden loss of vision, for that seems to be the first ocular symptom noticed in these cases? The locus of the morbid process, whatever it may be, can, I think, be found in one of three situations: First, within the cranial cavity; second, within the eye; third, in the course of the optic nerve between chiasma and eyeball.

The first assumption I regard as wholly untenable. The second is almost equally so, for, at the time when the blindness is greatest, the intra-ocular changes are comparatively insignificant. For the third, there are several facts which to my mind point strongly to this as the seat of the chief pathological changes.

I have found that a galvanic current applied directly to the optic nerve of the rabbit will speedily induce a blanching of the retina and nerve similar to that which occurs in those cases of "quinine blindness." I once, accidentally, produced a strikingly similar picture in the human eye, by the same means, in treating a deep-seated venous tumor of the orbit by galvanism.

A platinum needle, carrying a current from four carbon-zinc cells, was introduced quite to the back of the orbit, and from its direction and effects must, I think, have penetrated the optic nerve. The pupil, after the application had lasted about a minute and a half, became widely dilated, and the patient averred she could not see. A few minutes later I found vision with this eye reduced to counting fingers at one foot; the retina whitened in the disc and macula regions; the arteries slightly reduced in calibre; the nerve decidedly pale.

In this case the retina cleared up in a few days, but the optic nerve remained very much blanched, and the arteries very small. The diminution of vision, however, which finally settled down at $\frac{20}{200}$, appeared to be uniform; there was no concentric limitation of the visual field, and no color-blindness.

The sudden blindness from cinchonism may, I think, be explained best by assuming a rapid effusion into the lymph-spaces around the nerves, producing what might be called an external strangulation of the nerves, too transient to induce the phenomena of papillitis, but sufficient to cause œdema and blanching of the retinæ, and, no doubt, in some way, only to be decided by a post-mortem investigation, a permanent impediment in the blood-carrying capacity of the central arteries.

Pressure exercised upon the optic nerve as it passes through the porus opticus, whether from within, as in glaucoma, or from without,

as in the supposed case, would probably first impair or destroy the functions of the external nerve-fibres, in either case supposing these supply the peripheral portions of the retina, there would be concentric limitation of the visual field, and it is not difficult to understand why this form of limitation should be more perfectly concentric in the external or perineural, than in the internal or glaucomatous strangulation.

Such pressure, if suddenly induced, might, for a time, destroy all vision, and still admit of perfect restoration in the less injured central nerve-fibres.[1]

REMARKS.

DR. JOHN GREEN, of St. Louis, said that it seemed to him, in a case with such a complication, we were not justified fully in attributing the condition to the remedy employed, even though it was used in what might be called excessive doses. The puerperal condition, with threatened septicæmia, could account for very grave complications, not excluding the possibility of such as had been described as existing in the eyes of Dr. Buller's patient, without charging it upon the remedy employed. Certain it was that in the Southern and Western States quinine had been used in large doses; indeed, the remedy had been grossly abused, and it occurred to him occasionally to see a patient with atrophy of the optic nerve attributed to the taking of "too strong medicine," as they generally put it, and generally in connection with some grave form of disease, such as congestive fever, etc. The number of cases, however, in which there was a charge by the patient in such cases, was certainly small; and fifteen years' practice in the West had led him to look with extreme doubt upon reported cases of optic nerve lesion or blindness attributed to quinine-poisoning. He could not say what might not occur, but he believed that such cases were certainly very few. He was inclined to attribute the trouble, not to the remedy, but to the disease for which the remedy was administered. The remedy may have aggravated the condition developed.

DR. D. B. ST. JOHN ROOSA, of New York, thought that Dr. Green would be very much troubled to explain the singular coincidence in the case reported, namely, that a woman threatened with septicæmia, or having septicæmic symptoms, took large doses of quinine, had what had been known as its peculiar physiological effect upon the ears and the head, and at the same time became blind. He thought that it was, perhaps, going too far to excuse the quinine by the assumption that septicæmia might have caused the neuritis, and, if not, a certain amount of atrophy, certain changes in the retinal ves-

[1] In a further conversation with the family physician of this patient, doubt has been raised whether on the third day of treatment two or three doses of quinine were taken.—F. B.

sels. He thought that Graefe was the first who published any case of this kind, and he believed that the weight of evidence was in favor of Graefe's opinion that the retinitis in his cases was caused by the quinine. But, passing by Graefe's cases and coming down to his own, which he believed was next in publication,[1] he thought it would puzzle Dr. Green to explain the symptoms in his case upon any theory except that they were produced by the toxic effects of quinine. It was possible that he might make the criticism that those effects were due to alcohol; but then again, the profound deafness which passed away would invalidate that objection. It was interesting to Dr. Roosa to note that, in his case, which he saw in the stage in which the changes affecting the nerve occurred, the lesions corresponded exactly with those reported in the case the history of which had just been read, and those reported in a case by Dr. Voorhies, and published in the "Transactions of the American Medical Association." His first patient died within the present year, from some disease of what nature he knew nothing; but, up to within a few months of his death, there remained the same appearances given in his description of the case: telescopic vision, $\frac{3}{20}$.

Then, the other case which he saw, a Cuban lady who was brought to him for examination some years after the changes in the retina had occurred, presented the appearances and history which warranted him in thinking that the disease was caused by the remedy, and not by the attendant circumstances. Knowing it to be somewhat irrelevant, he would say a few words concerning the administration of quinine to prevent septicæmia or pyæmia. Occasionally we had occasion to use quinine in that manner, but he was firmly convinced that giving quinine for that purpose was an irrational procedure, hastened the doom of the patient if pyæmia had occurred, and lessened the only chance of elimination, through the bowels, the skin, and other emunctories, of the poison of that disease.

One thing more, he did not know whether Dr. Buller thought that his treatment had anything to do with the ending of the case. His own patient had practically no treatment except hygienic care, and he did just as well, and the result was just as good as in the case narrated by Dr. Buller. Perhaps, if he had seen the case early, he would have used the same means; but the patient reached the final condition, in which he remained three years, without special medication.

Dr. Green said that he did not deny the possibility of the toxic effect of quinine producing unfavorable results in very exceptional cases; but, at the same time, he thought that in most cases published it had been difficult to clearly distinguish between the results of the disease for which quinine had been given, and those produced by the toxic influence of the quinine itself. Secondly, the toxic effects produced by quinine upon the healthy organism might simply aggravate the abnormal processes already existing, or establish new

[1] Knapp's Archives, vol. viii., p. 392.

ones, and in the latter case he should not dare to say positively that they were due to the quinine rather than to the aggravated symptoms of the original disease. There had been a great deal of talk among the people concerning the bad effects produced by quinine, but he had not met with a case which bore the process of sifting when the trouble had been attributed to the remedy, and had found equal probability in favor of the condition being due to the co-existing disease, and not to the remedy.

DR. W. S. LITTLE, of Philadelphia, had seen, during the last winter, at the Jefferson Medical College Hospital, two cases in one week, in which there was atrophy of the optic nerve and retina, supposed to be due to quinine. Both patients, one eighteen and the other twenty-six years of age, after taking large doses of quinine to break up an attack of intermittent fever, suddenly became blind. In the first case, about half sight remained; in the second, there was slight improvement in both eyes.

DR. RISLEY directed attention to the fact that a case was published some time since, in which hemorrhages into the eye-ground were found after an intermittent paroxysm.

DR. BULLER thought that Dr. Roosa had answered Dr. Green's objection to the possibility of his case being one of blindness from quinine. It could not be expected ever to get a case of pure quinine blindness, because quinine would probably never be taken in sufficiently large doses to produce such a result without the complication of disease. But the cases published had all presented some strikingly characteristic feature which must be attributed to some common cause, and that had been claimed to be quinine. Common features were loss of eccentric vision, entire loss of peripheral color-sense, with small central field of vision, exceeding smallness of the retinal vessels, pallor of the optic nerve, etc. Taking these features into consideration they must be attributed to one common cause, and that cinchonism. He thought that it was an inflammatory affection, and that it should be treated accordingly; at least, judging from the result, for it was better than most of those which had been reported. It might be that his better result was due to not prolonging the use of the quinine. He thought that the case mentioned by Dr. Risley did not come into the same category, because no such changes had been found in this class of cases.

A CASE OF MARKED NARROWING OF THE FIELD, WITH DIMINISHED ACUITY OF VISION, FOLLOWING THE USE OF DUBOISIA, AND PRESUMABLY A RESULT OF THE USE OF THAT DRUG.

BY J. P. WORRELL, M.D.,
TERRE HAUTE, IND.

MRS. L. R., aged thirty-six, complained of difficulty in using the eyes for near work. After reading a short time, her eyes would give out, causing blurring of letters; slight heaviness over the brows. Thought vision for distance was unimpaired. Examination of the eye shows nothing unusual; the bulbar and tarsal conjunctiva clear and transparent, with very slight hyperæmia. No ciliary injection. Deep anterior chamber. Pupil 2.5 mm. in diameter; active under alternation of light and shade.

Ophthalmoscope showed fundus clearly. Beyond slight striation, nothing abnormal to be noted. Vertical vessels seen with $+\frac{1}{48}$. Horizontal vessels blurred by this glass.

In each eye, V.$=\frac{15}{XXX}$. Vertical lines seen brightest. Jaeger 3 read from 10–12″ with some difficulty.

For the purpose of correcting the anomaly of refraction, a solution of duboisia, 2 gr. to fl. ʒ j. was ordered to be used three times a day. This had been instilled into each eye three times, when, on the afternoon of the 18th of July, she observed the sight of left eye much impaired. She continued, however, to use the drops until the following afternoon, when she again visited my office. O. S. could then count fingers at two feet. Field contracted to a small area around fixation-point. Some supra-orbital pain. I found the conjunctiva slightly injected; anterior chamber of normal depth. Pupil dilated ad maximum. Ophthalmoscope shows humors clear; fundus distinctly seen; no venous pulsation, T.$= +1$? No complaint made of O. D., the refraction of which was determined with considerable certainty. The glass selected, $+\frac{1}{60} \bigcirc +\frac{1}{72}$, c. ax. vertical, gave V$=\frac{15}{XX}$? Eserine directed to be used in both eyes.

July 20th.—O. D. V. fallen to $\frac{15}{XXX}$ with correcting-glass; O. S. V$=\frac{6}{C}$; with $+\frac{1}{60}=\frac{6}{LXX}$. Field not taken.

July 23d.—O. D. V. sunk to $\frac{15}{LXX}$, even with correcting-glass. Oph-

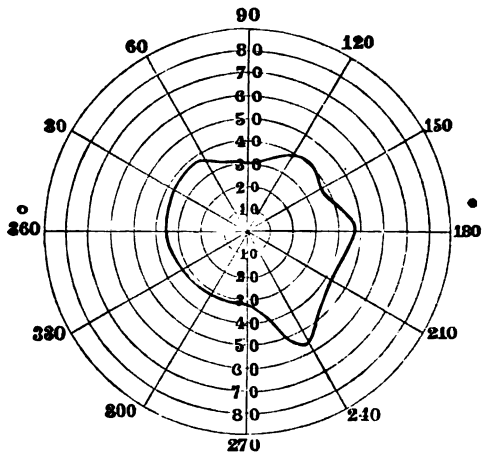

FIG. 1.

thalmoscope shows fundus clearly. Field irregularly contracted. (See Fig. 1.)

O. S. V=$\frac{10}{C}$, Jr. No. 6, with +$\frac{1}{20}$, read at 10″; pupil of nor-

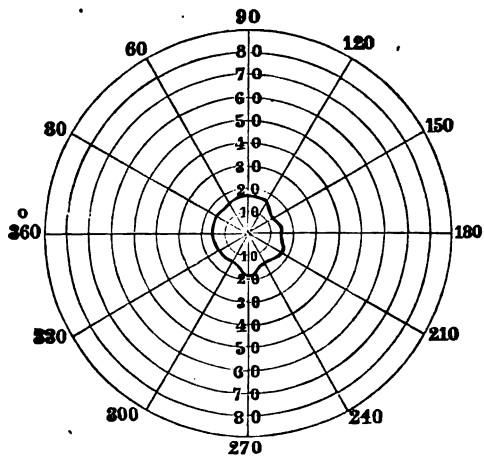

FIG. 2.

mal size, active under light and shade. Field embraces about 15° around fixation-point. (See Fig. 2.)

July 27th.—O. D. V=$\frac{15}{LX}$; slight increase of field.

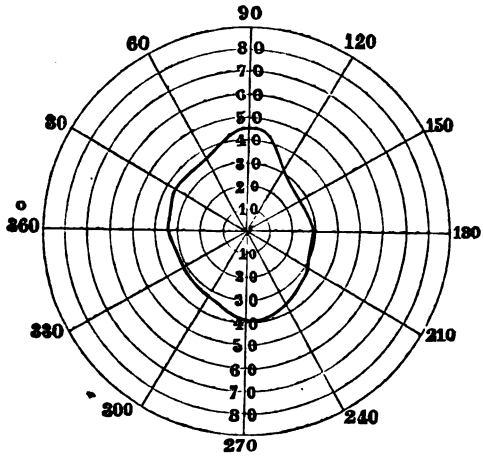

FIG. 3.

O. S. V=$\frac{15}{LXX}$? Slight increase of field. (See Fig. 3.) Some supra-orbital pain.

July 30th.—O. D. V=$\frac{15}{XX}$? On this date, contraction of field slight and symmetrical, being narrowed about 10° on all sides.

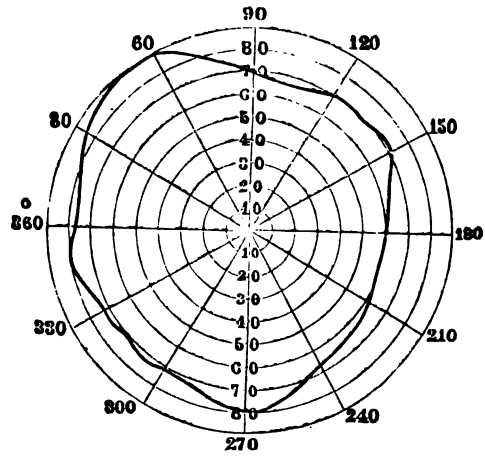

FIG. 4.

O. S. $\frac{15}{LXX}$. Pain in supra-orbital region.

August 3d.—O. D. V=$\frac{15}{XX}$ with correcting-glass.

O. S. V=$\frac{15}{XXX}$ with $\frac{1}{18}$ cyl. ax. vert.

From this date the improvement was continuous, so that on August 27th, at which time right field was normal, and that of O. S. nearly so. (See Fig. 4.) Glasses were ordered to correct her refraction, with which O. D. had acuity of $\frac{15}{XV}$, and O. S. of $\frac{15}{XX}$.

The accompanying diagrams give dimensions of the left field at different dates, showing the extreme degree of constriction on July 23d up to that of August 27th, when it had attained its maximum size. One illustration is also given of the right field. The dimensions of this field ultimately became normal. No regular mention has been made of the tension, as the increase, if any, was almost imperceptible—might be, perhaps, +1?

An examination on March 3, 1881, revealed the fact that the eyes had remained as at the close of the above record.

This case dispels any hope which may have been entertained that in duboisia we have a remedy, the use of which is free from the dangers that attend the employment of atropia. The case has had to me additional significance, as being one in which the surgeon might readily be pardoned for the use of the remedy, as neither the symptoms of the case, the condition of the eye, nor the age of the patient, were calculated to warn him of such a possible result as here attended the use of the drug in question.

INTERMITTENT CONCOMITANT CONVERGENT STRABISMUS.

By G. C. HARLAN, M.D.,

PHILADELPHIA, PA.

A VERY marked case of this peculiar form of squint has been under my observation for several years. I have nothing to offer in elucidation of the obscure pathology of this rather rare affection, but simply put it on record.

The patient is a bright little boy, the son of a physician, and when the squint first appeared was three years of age, and in good health. His father was in the habit of taking him out to drive daily, and he was occasionally aroused for this purpose from his afternoon nap. His mother noticed that he frequently awoke on these occasions with a decided squint of the left eye. When the drives were given up on account of the approach of winter, the squint occurred on waking in the morning, and was soon observed to be regularly intermittent in the tertiary type. One day the eyes would appear perfectly straight, and on the next there would be a strabismus of 3′′′ or 4,′′′ which would continue until bedtime. Though the origin and course of the affection were not at all those of hypermetropic strabismus, the refraction was frequently and carefully tested by the ophthalmoscope, under atropia, and seemed to me to be nearly, if not quite, emmetropic. As another ophthalmic surgeon, who saw the case, thought there was a low degree of hypermetropia, convex glasses were faithfully and constantly worn for many weeks, but without the slightest effect. The most anxious and constant watching failed to reveal any source of cerebral or nervous irritation, and the case was finally left to nature. The regularity of intermission continued, with great exactness, for rather more than a year, when it was suddenly broken up by the occurrence of the squint on an "off day," and has not since returned. The squint became the rule and the intermissions irregular, and less and less frequent. At the present time, three years after its commencement, the squint is practically constant, with

only very rare and doubtful intermissions, though it varies in degree within very wide limits, and without any reference to the use of the eyes.

REMARKS.

THE PRESIDENT directed attention to the form of strabismus occurring in chorea, and as the choreic symptoms subsided, the strabismus disappeared. The question might arise, whether or not the essence of the disease did not exist in some choreic disturbance.

DR. HARLAN said that the fact spoken of by the President was taken into consideration, but no evidence of chorea could be found by a careful tracing of the clinical history.

A CASE OF HEMORRHAGE NEAR THE MACULA LUTEA, FROM CONCUSSION.

BY DANIEL B. ST. JOHN ROOSA, M.D.,

NEW YORK.

I DESIRE to report a case of what I consider to be a hemorrhagic, or exudative process, involving the macula, caused by concussion of the retina or choroid, or both, from a bullet. A young man, who was engaged in marking a target for rifle-practice, looked out from behind his shield during the firing, and was hit over the right lachrymal sac by a bullet. On examination by Dr. Rankin, of Newport, a few hours after the accident, the eye was found closed and the conjunctiva very much swelled. The course of the ball was plainly made out, as it can be to-day. It passed downward under the skin, to the side of the lower part of the nose, where it turned and passed beneath the muscles of the cheek to the point of lodgement, about one-fourth inch below the glenoid fossa, where it can be plainly felt. This accident occurred on April 5th, and he was sent to me in July, by Dr. Rankin, on account of loss of vision in the eye of that side. The patient states that he could see quite, if not perfectly well, immediately after the accident. Four weeks after the accident he found that his vision on fixation was impaired. He could no longer sight a gun with the affected eye. His vision is now $\frac{16}{200}$, but there is a central scotoma. On the other side it is $\frac{20}{20}$. The refraction is myopic. On the use of prisms crossed double images are brought out. By the ophthalmoscope the media are found to be clear, but just below and involving a part of the macula there is a red patch with displaced pigment about it. The eye has completely recovered from

the external inflammation following the injury. The upper jaw is still tender at the point from which the ball turned to go under the ear. The patient was seen by me several times during the months of July and August. The vision decreased somewhat; the macula underwent some change; the hemorrhagic spot became yellow, atrophic; the double images remained the same. It appears that the eye-ball was merely grazed by the bullet, and that the damage to the retina or choroid, or both, was due to concussion. The insufficiency or paresis of the internal rectus may have been an old affair, an incident of the myopia.

REMARKS.

DR. O. F. WADSWORTH, of Boston, said that Dr. Roosa's case reminded him of one where a man was struck upon the right side of the nose with a chisel, which was said to have entered half an inch or more, and was then drawn out, and there was a scar in that locality. The man was knocked down by the blow, but stated that he did not lose consciousness. He got up, walked into a room upstairs, and after a time was taken home from the shop. He was kept in bed for some time, and there were no special cerebral symptoms; but the eye on the opposite side—the left eye—had lost its sight apparently. He was unable to lift the lid, and was seen by an oculist on the same day, who was unable to determine what was the patient's exact condition. The ability to lift the left eyelid returned slowly, and since Dr. Wadsworth first saw him, the movements of the eyeball had been restored; but there was still complete anæsthesia of the cornea, largely of the conjunctiva, no vision, atrophic condition of the optic nerve, and what appeared like a very narrow rupture of the choroid. The cornea was not absolutely clear, but sufficiently so to show distinct atrophy of the optic nerve. On the side of the injury the eye was good. He supposed that such cases could be explained, as Berlin had explained loss of vision after gunshot wounds, by injury in the foramen.

The wound was upon the right side, and the ocular symptoms were confined entirely to the left eye.

DR. G. HAY, of Boston, asked Dr. Wadsworth how he knew that the chisel did not go into the left orbit.

DR. WADSWORTH answered that there was nothing to show that the tool penetrated the left orbit. There was some bleeding from the nose at the time of the injury, and the sense of smell was lost for some time, but that returned.

THE PRESIDENT remarked that there were some interesting facts concerning injury to the orbit by the extension of fissures through the optic foramina, which had been set forth by Berlin, and that the lesion was a frequent attendant upon fractures at the base of the skull. He remembered to have seen a man who was struck upon the side of the head, had no injury at the site of the blow, but there was atrophy of the optic nerve upon the opposite side.

OPTICO-CILIARY NEUROTOMY.

By O. F. WADSWORTH, M.D.,
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THE operation of optico-ciliary neurotomy is yet far from having attained a definite and fixed position in ocular surgery. It still has strong opponents and warm defenders, and while, perhaps, no one would now give it so extended an application as Schoeler at first claimed for it, whether it will retain a permanent place as an effective and valuable method in a more or less extensive class of cases, or whether it will eventually be generally abandoned, can be considered by no means positively settled. It is with the hope of contributing in some degree to the solution of this question that I report fifteen cases in which I have performed the operation. Though two of these are so recent as to be of no importance as regards the eventual effect produced, others I have been able to follow for periods sufficiently long to make them of value in this respect—from five to thirty-two months.

CASE I.—W. S., forty years of age, boot-black. In 1865, a cataract was removed from the left eye, but after two years the sight failed, and in the course of some months the eye became useless. In 1868, cataract removed from right eye. The left was quiet till Sept., 1878, then became red and tender in upper ciliary region, with photophobia. He was treated at the Eye and Ear Infirmary; the unpleasant symptoms passed off, and near the end of October he resumed work. But, after working a week, photophobia and redness of the left returned, and three or four days later, November 7, 1878, he came to me. Left: there was moderate circumcorneal congestion; tenderness in upper ciliary region; clear cornea; coloboma upward; capsule stretching from the cicatrix above downward to behind iris, leaving a clear opening more than 1‴ in diameter; no reflex from fundus; no perception of light. Right: large coloboma upward; some capsule at lower and inner sides of pupil; moderate photophobia. Atropine L. and rest. Two days later he saw sparks before the R. on exposure to light.

November 11th.—Neurotomy.—Two sutures were placed in the internal rectus; its tendon was divided, and Tenon's capsule widely opened; dissection with scissors back to opticus, which was divided close to the globe. A little further dissection about the opticus allowed its stump to be rolled forward into a central position in front, and all attachments in a wide region around it were severed, including the insertion of the inferior oblique and some of the venæ vorticosæ. The eye was replaced, the internal rectus tendon sutured, and a compressive bandage applied.

There was considerable exophthalmos immediately after the operation, which was slightly increased at the end of twenty-four hours, and then gradually decreased. The bandage was continued for ten days, and then iced compresses were applied during four or five days. Chemosis of conjunctiva was marked for some time, and it was two weeks and a half before it had disappeared. A week after the operation there was a small amount of blood at the bottom of the anterior chamber, and on the thirteenth day, after the head had been held in an inclined position, a clot $\frac{3}{4}'''$ high. This was nearly absorbed two days later. Morph. sulph., $\frac{1}{8}$ gr., was given the night after the operation, more on account of headache from the ether than from pain about the eye, and for two nights afterward chloral, xv. grs.

The cornea was completely anæsthetic. The man returned to his usual occupation in three weeks.

There was still a little congestion at the inner side of the cornea at the end of two months. A divergence of about 1''' persisted. Movement inward was not quite as extensive as of the other eye, in other directions normal.

There has never been any discomfort in the eye since. The tension soon became decidedly diminished, and in the course of a year the iris atrophied somewhat and the eye became a little smaller, but has scarcely changed in size now for a year and a half.

For three or four months the cornea retained its transparency, and then its lower part became gradually opaque in the anterior layers, and a whitish membrane began to form across the pupil.

July 19, 1881.—A membrane closes pupil and coloboma; the anterior layers of the lower two-thirds of the cornea are opaque. The cornea is still wholly anæsthetic.[1]

CASE II.—M. J. T., fifty-two years of age, laborer, received a wound of the left eye from a piece of stone, in December, 1877, for

[1] December 27, 1881, condition unchanged.

which he was under treatment three weeks, the eye then becoming quiet. January 15, 1879, he entered the City Hospital, stating that the injured eye had been increasing in size for six months, and had been painful for two months, while of late, sight in the right eye was beginning to be impaired. The left cornea was wholly opaque and markedly staphylomatous.

January 17th.—Neurotomy; the operation as in the previous case, except that there was only one suture placed in the internal rectus. Exophthalmos immediately after the operation not very great. Bandage. During the following night the man started up from his bed and moved about the ward shouting "Murder." The next day exophthalmos was greater, the lower lid rolled inward, and the globe exposed over a space some two-thirds the height of the cornea. The exposed parts of the conjunctiva were chemosed. On the 20th, chemosis less; some superficial ulceration of cornea. Bandage omitted.

From this time the exophthalmos decreased; the ulceration was stationary for a few days, and then healed; the staphyloma slowly became larger. Cornea anæsthetic.

February 1st.—Paracentesis of cornea. The cornea collapsed, but in two days had again become prominent; the paracentesis was repeated every two to four days till March 10th, when the man left the hospital.

May 17th.—He entered the hospital again with Bright's disease. The eye had been free from pain; the cornea was still anæsthetic, but quite prominent. During his six weeks' stay in the hospital, Dr. Williams saw him, and twice slit the cornea across nearly its whole width. Both times the extensive wound healed without difficulty. He has not been heard from again.[1]

CASE III.—W. G. M., forty-eight years of age, wood-turner; entered the City Hospital, January 24, 1879. Two months before his right eye was struck by a piece of fishing-rod, and he had since suffered from severe pain and photophobia.

January 27th.—R., an irregular cicatrix at the inner side of the cornea, to which the iris was drawn over and attached; scarce any anterior chamber; bulbar conjunctiva thickened and congested; no V.; L., great photophobia; moderate conjunctival congestion; cornea and iris normal. Neurotomy; moderate exophthalmos; both eyes bandaged.

On removing the bandage the next day, the photophobia had disap-

[1] Died in the spring of 1880.

peared. Iced compresses were substituted for the bandage after forty-eight hours.

February 12th.—He went home to Vermont with clear and anæsthetic cornea, still some congestion and swelling of conjunctiva at the inner side. Shortly after his return home there was a temporary inflammation of the right eye, which appears to have been a conjunctivitis. A few months later I saw him, and he said the eye had been free from pain, as it was then. Cornea still anæsthetic.

His employer informed me that M. died in March, 1881, of inflammation of the bowels. The eye had always been quiet.

CASE IV.—M. McS., twenty-one years of age, entered the Massachusetts General Hospital, January 31, 1879, for acute articular rheumatism. His left eye was then blind. On February 5th, this eye inflamed, and on the 8th I saw him. There was iritis; complete occlusion of pupil; bulging of iris; severe pain; no perception of light. During the next fortnight his general symptoms were very much relieved, but the inflammation and pain of the eye continued, and the iris bulged more, here and there touching the cornea.

February 18th.—Neurotomy; back of globe cleared from all attachments over a wide circle about opticus. The insertion of inferior oblique divided in this, as in all cases; whether the superior oblique was detached, I am not sure, as no note was made of this at the time. The hemorrhage was not great, nor was there a very large amount of exophthalmos. Pain ceased immediately after the operation, and there was only the usual tenderness for two or three days over the wound.

March 18th.—He left the hospital with the eye freely movable in all directions, standing slightly higher than the right, but with no apparent divergence. Cornea clear and anæsthetic.

After leaving the hospital he worked on a farm, and for four weeks was free from pain. During the next month, however, he had four or five attacks of pain, always confined to the eye itself, usually coming on during sleep, and never lasting so long as twenty-four hours. He had also felt pain in the eye when jarred, as by the fall of a heavy cover, not from lifting.

May 15th.—He came to the hospital during one of these attacks. There was general congestion of the bulbar conjunctiva and a little deep congestion. The cornea was clear and anæsthetic, except close to the limbus. The discolored iris no longer bulged forward as before neurotomy, but stretched across the bottom of a fairly deep anterior chamber, its centre being the most prominent part. T.

diminished. Considerable tenderness to pressure in upper and outer ciliary region. Atropine seemed to have no influence on the pain. Hot fomentations advised.

May 20th.—He reported that the pain ceased during the night of the 15th, but returned on the 18th suddenly, and lasted some thirty hours. Now, considerable congestion, tenderness to pressure as on 15th, but less; cornea still insensible. Complains of a dull ache in right eye. Enucleation. Capsule much more closely attached to globe than normally, especially at inner side, the back of the globe attached to the tissues of the orbit by firm, dense tissue over a space some half inch in diameter. He left the hospital in two days, free from pain. I have not heard from him since.

The eye was placed immediately in Müller's fluid and examined later. The retina was completely detached, and stretched forward from the nerve-entrance in the form of a small cord; the choroid everywhere in place. The posterior third of the eye was removed, and the choroid carefully lifted up; the ciliary nerves in their course along the inner surface of the sclera were much smaller and thinner than normal; teased, and examined under the microscope, they appeared to consist simply of the sheaths of Schwann, with their nuclei; no trace of myeline, and nothing that might pass for an axis-cylinder, could be discovered.

CASE V.—W. S., aged forty-one, laborer; entered City Hospital, February 14, 1879. Ten months before he had been kicked on the right eye by a horse. Sight failed soon after. For the last three months, right eye inflamed and painful, and the last month left eye sensitive also. Right, moderate congestion; cataract; pupil fastened to lens, except upward and outward; no V. Neurotomy. Bandage three days; then cold compresses. He left the hospital, March 5th, with some conjunctival congestion; cornea clear and anæsthetic; slight divergence. He has been seen from time to time since, and has had no inconvenience aside from occasional conjunctivitis of either eye, of small amount. July 20, 1881, the cornea perfectly transparent; anæsthetic everywhere; tension diminished; no shrinking; lens partly cretaceous, shaking a little with movements of eye; iris shrunken upward and outward, where not fastened to lens.[1]

CASE VI.—T. S., aged forty-five, laborer; came to the Massachusetts General Hospital, September 2, 1879. Six years before he had received a blow on the left eye, and since had been able to work only about half

[1] December 25, 1881, condition unchanged.

of the time, the eye being free from pain for a few months, and again for some months so painful as to keep him idle. He had now been unable to work for more than three months, and had lost flesh and strength from pain. The left eye was congested, shrunken, with indentation from superior rectus; cornea fairly clear, smaller than the other, containing some vessels; edge of pupil nearly everywhere fastened to opaque lens; tenderness to pressure on upper and outer ciliary region. He complained of weakness of the right eye also. Both the patient and his wife refused enucleation positively, but acceded to a proposed neurotomy. The operation was from the inner side, and presented no peculiarity, except that there was generally a much more intimate connection between Tenon's capsule and globe than normal. The bleeding was not excessive, but the amount of exophthalmos, immediately after the operation, was more than usual. The following day the exophthalmos was greater; the bandage was omitted, and iced compresses applied. For two days longer the general swelling of the orbital tissues was great and tense, and I feared phlegmon of the orbit.

Comparatively little pain was complained of, however, and by September 8th, six days after operation, the inflammation had much subsided, and the patient was very comfortable. He left the hospital September 18th.

He reported several times at intervals, the last time in March, 1880. The eye was quite comfortable; he said that only when he took cold did he have a little sting in it, "not enough to mind." There was then, and had been, some pain on *considerable* pressure in upper and outer ciliary region, but this pain was not great, and seemed gradually lessening. The eye was smaller than before neurotomy; the cornea contained a number of vessels in its tissue, and was moderately sensitive.

[NOTE.—The man was seen on October 16, 1881. He had had no pain or uneasiness in the eye since March, 1880. The eye was much shrunken, quite hard, feeling as if it might contain bone; the cornea about 3‴ in diameter, cloudy, moderately sensitive; no pain from firm pressure on any part of the eye.]

CASE VII.—G. D. G., aged 22, painter; entered City Hospital, February 9, 1880. Lost sight of left eye when three years old. Three years ago this eye was red and painful for a time. One year ago it again became painful and continued so for three months, the pain being enough to prevent sleep. The last three months it had been painful, mostly at night. R, not affected. L., a horizon-

tal cicatrix at inner side of cornea, which is otherwise clear; pupil drawn far to inner side behind cicatrix, very small; iris a little changed in color; scarcely congestion; some tenderness; some divergence.

Neurotomy. Two sutures in internal rectus to correct divergence. He left the hospital February 18th; cornea anæsthetic.

July 13, 1881.—Patient has been seen at long intervals. There has been no shrinking. Cornea still transparent. There is capability of distinguishing touch over the whole cornea, but no feeling of discomfort even with considerable pressure with a probe, nor sign of shrinking, as there is when the R. cornea is touched never so lightly. No tenderness in ciliary region. T. lessened. Iris and pupil as before operation. Slight convergence.[1]

CASE VIII.—L. H., a girl, aged eight; was struck in the R. eye by the horn of a cow, in July, 1879. In November she began to have pain in the L. eye, and was confined to bed for a month. I saw her January 19, 1880. There was decided photophobia. R., moderate congestion; globe much shrunken; cornea 3‴ in diameter; a cicatrix in sclera upward and inward, concentric with corneal edge, nearly ½″ long, in part dark and projecting; no tenderness to pressure. L., little congestion; pupil quite small and irregular, and closed by gray membrane. She had recently made a long journey from the West, and was still tired; but, with tonics, rest, and atropine to the L. eye, her general condition improved rapidly. January 26th, counted fingers at 3′ L.

February 1st.—R., tender to touch, and a little congested. L., little congested; fingers, 6′–7′.

Neurotomy, R.—Free opening of capsule, opticus and tendons of both obliqui divided, and back of globe well bared. Hemorrhage not excessive, though face much congested from ether, and ceased as soon as the division of attachments allowed the back of the eye to be rolled forward. Bandage removed after forty-eight hours. No pain; no ecchymosis of lids; very little swelling. The catgut suture had not held, and there was considerable eversion.

February 8th.—L., fingers at 10′.

A fortnight later she struck the outer angle of the L. eye against a table, and although she did not complain of pain, there was on the 26th more congestion of this eye, and she counted fingers only at 5′–6′.

[1] December 9, 1881, condition unchanged. A very light touch with the torn end of a bit of paper is not always perceived.

The congestion passed away, but sight still decreased a little during the next six weeks.

April 10th.—Iridectomy was attempted; the iris tore and bled freely; the small opening made soon closed, and there was no improvement of vision.

June, 1881.—The R. has remained free from tenderness or pain. She can no longer count fingers with the L.

CASE IX.—K. B., aged twenty-three; entered City Hospital, August 30, 1880. The sight of the right eye had been lost for a long time. For eight weeks she had had pain in and about it, for which she had been obliged to take morphia daily. R., considerably shrunken, tender to pressure; cornea containing vessels. L., cloudy opacities of cornea. Photophobia.

Neurotomy.—Four or five days later she had an attack of diarrhœa, which weakened her much. September 27th she left the hospital. The globe small and soft; tenderness much less; the vascular cornea sensitive.

March 16, 1881.—The globe has shrunken more; the cornea is two-thirds the diameter of the other, vascular, sensitive. She complains of pain and tenderness, but bears considerable pressure without noticing it when her attention is distracted. Declines enucleation.

July 11, 1881.—Still complains of pain and tenderness, but the pain is dull, in the brows—not more on one side than the other. She has been obliged to sew for her livelihood, and has quite imperfect sight in the left eye; is anæmic and weak; and it seems probable that a large part of the pain complained of is caused by overwork of this poor eye. She is unwilling to have the eye touched, and it is, therefore, impossible to determine whether there be really tenderness. Refuses enucleation.[1]

CASE X.—J. D., aged eleven, school-boy. When four years old, the right eye was struck by a piece of slate, and its sight lost. Early in the fall of 1880 this eye began to feel heavy and painful whenever he read much, and he was obliged to leave school. Then the eye ceased to trouble him for a time, but in January, 1881, he again had pain in this, and in the left eye also, from reading.

[1] December 5, 1881.—The eye is quite free from congestion; not smaller than in March; soft; not tender to pressure on the ciliary region; cornea less vascular, but sensitive. The patient now states that she has had no pain in the right eye since four or five months after the neurotomy, but that she has some dull aching above the left eye after using it for a time.

January 24. 1881.—Admitted to the City Hospital. Right eye smaller; its cornea three-fourths the diameter of the left. A cicatrix, to which the iris is fastened, runs diagonally across the cornea and extends a little into the sclera. A little sensitiveness to pressure. The cornea contains a few vessels. Neurotomy. Discharged "well" February 2d. No note was made in the record of the state of the eye on that date, but the cornea was not anæsthetic.

[NOTE.—September 30, 1881.—Has been employed as errand-boy since leaving the hospital. The eye has been free from pain, and he has been able to read without trouble. Globe nearly free from congestion, although there is a moderate trachomatous affection of both lower lids; cornea generally clear, but containing a few fine vessels, its sensibility greatly diminished, not wholly anæsthetic; no tenderness to pressure; no further shrinking; —T.]

CASE XI.—R. M. G., aged eleven, school-boy. Admitted to City Hospital, February 2, 1881. In August, 1881, right eye struck by a stone; under treatment at the Eye and Ear Infirmary six weeks; since, unable to attend school because reading causes pain in the eyes. Right cornea somewhat irregular in outline, contains many fine vessels. A horizontal cicatrix extends more than half across the cornea, and 2‴ into the sclera at the inner side. The thinned and discolored iris is fastened to the cicatrix, and above is separated for a short distance from its ciliary attachment. Little tenderness; sees movement of hand against the light. Neurotomy.

February 24th.—Discharged. Corneal sensibility lessened, not lost. He returned to school from the hospital, and had no further difficulty in studying.

July 18, 1881.—He came to the out-patient department with a catarrhal conjunctivitis of the right eye, which passed off under treatment. The cornea contained fine vessels, except in a small space half way between the scar and the lower edge. This free space was anæsthetic. Elsewhere there was sensitiveness, but decidedly less than that of the left cornea. —T. No tenderness.

CASE XII.—J. M. J., aged eleven, school-boy. In December, 1880, he received a blow on the right eye from a stick. The eye was painful for some two weeks, then became quiet. Early in February, 1881, however, he began to have pain in it again on attempting to read or study.

An irregular cicatrix ran from the inner edge of the cornea nearly to its outer edge. To this the discolored and stretched iris was fastened. Moderate congestion; no special tenderness; bare per-

ception of light. He was treated as an out-patient at the City Hospital for a few days, without relief.

On February 17th, he stated that he had pain the night before in the left eye also. He was taken into the hospital and neurotomy performed. No pain after operation.

March 2d.—Discharged. The cornea clear, except at the cicatrix, anæsthetic.

[NOTE.—August 13, 1881.—The boy was at school after leaving the hospital, till vacation, at the end of June, and had no trouble. Now, divergence 1½‴; no congestion; cornea (except cicatrix) clear, anæsthetic except close to the limbus; iris looks better; —T.; no tenderness.[1]]

CASE XIII.—T. C., a boy, six years and nine months of age, was seen in consultation, December 12, 1880. Two weeks before he had cut his right eye while whittling. He complained little at the time, but after two or three days had photophobia, pain in brow, etc. For five days he had had atropine and bandage. There was moderate congestion; cicatrix of cornea from its outer edge to near centre; iris attached to cicatrix and bulging forward at its inner and upper part; pupil 1½‴, irregular, with grayish reflex. So much photophobia as to prevent accurate examination of L., which, however, except for slight congestion, appeared normal. The father was strongly warned of the danger of sympathetic ophthalmia, but it was only on March 8, 1881, that I saw him again. Meanwhile he had had much photophobia, and been kept in a darkened room.

March 10th—Moderate congestion; cornea clear, except for linear cicatrix; iris attached to cicatrix, and everywhere bulging forward nearly to cornea; globe soft. Neurotomy. Division of internal rectus, of inferior, and most of insertion of superior oblique. Opticus cut short; back of globe cleaned well toward equator. Moderate bleeding; no exophthalmos; two sutures. The day after operation photophobia had disappeared, and he made no complaint afterward. His mother was so anxious about him, however, that he was allowed to go out but little for more than a month, and then only with a shade or bandage over the eye, although he did not wish it. Even in May, when I saw him last, he had been watched over so closely that he was much afraid of having anything done, and I could not test the sensitiveness of the cornea. There was still a

[1] December 27, 1881, condition unchanged.

button of granulations at the site of the conjunctival wound, which kept up some congestion at that part.

[NOTE.—October 1, 1881.—The boy's mother states that the granulations at the inner side of the cornea disappeared early in June. He never complains of the eye, and has no trouble at school. The eye is generally pale, but reddens when he gets much heated while playing out of doors, the redness passing off readily. Scar in cornea less marked; cornea transparent generally, one or two vessels running into it from the lower edge; a little below the cicatrix a faint grayish line, slightly uneven and elevated, runs partly across the cornea—a scratch of the epithelium. There is little, if any, sensibility of the cornea. The iris no longer bulging, but anterior chamber shallow. Globe soft, of the same size as when operated on.]

CASE XIV.—J. S., thirty-two years of age, stone-cutter; was struck on the left eye by a rope, in the summer of 1880. The eye was very painful for some two weeks. Afterward he noticed no defect till about the first of May, 1881, when the sight of this eye began to fail, accompanied by dull pain in the brow and temple. July 1st, I saw him at the City Hospital. He had been using atropine for a time without relief. The left eye was moderately congested; cornea clear; iris turbid and much discolored; pupil free and of fair size; lens cataractous. There was no marked tenderness. He counted fingers at 2′. He complained that for six weeks he had been able to use the right eye for a short time only, and it was becoming weaker. Vision was normal in the right eye, but its accommodation decidedly below the norm.

July 8th.—Neurotomy. Both obliqui divided and posterior half of globe cleared. Hemorrhage and exophthalmos moderate. He left the hospital July 11th, and returned to his work on the 19th, but was unable to continue at it because of inability to judge well differences of level. July 25th, when last seen, the cornea was anæsthetic; the eye freely movable; no pain or discomfort. Atropine did not affect the pupil.

CASE XV.—D. H., aged 40. In April, 1880, a piece of iron entered his left eye; pain and photophobia four months, then the eye became quiet. Early in 1881 pain returned, and June 6th he presented himself to Dr. Williams, at the City Hospital. A point of metal was visible near the lower edge of the cornea; an incision was made, and a splinter of iron 10 mm. long removed. He left the hospital June 13th, but returned a month later and came under my care. During this interval there had been dull pain in left eye and brow, and for

the last week, after using the right eye for an hour or two, there would come a "dull, heavy ache" in this eye also, with dimness of vision.

The left globe was somewhat shrunken, moderately congested; its cornea about two-thirds the normal diameter, partially transparent, with many vessels beneath the surface. Tenderness to pressure.

July 13th.—Neurotomy. Both obliqui divided and nearly the whole posterior half of the eye cleared. Very little exophthalmos. Three days later he left the hospital, the vascular cornea everywhere sensitive, though less than the cornea of the other eye. No special tenderness.

[NOTE.—October 16th.—Patient seen to-day. He states that during August he worked in the hay-fields in the sun, and for four weeks had a "kind of ache" about the left eye. Since then the eye has been quiet, except that once in a week or ten days there is a "heavy feel" over the left brow for a few minutes. The cornea is a little smaller than at the time of operation, vascular and sensitive. The globe rather small, hard. Pressure on the ciliary region near the scar is painful when firm; elsewhere bears even firm pressure without pain.]

In the first case the bandage was continued much longer than in any of the others, and, I believe, tended to keep up the chemosis; in the last few cases iced compresses were substituted for the bandage so soon as danger of vomiting from ether was over. There was in no case any large amount of hemorrhage; in the first few cases the precaution was taken to close the lids and make gentle pressure for a few minutes after division of the opticus, but this has not appeared necessary in the later cases.

Indeed, it has seemed that the most effective means of checking the bleeding was the thorough division of all attachments of the globe at the posterior pole of the eye; at least, I have found bleeding to rapidly cease so soon as these attachments were divided freely enough to permit the easy rolling of the stump of the opticus to the front. And it is not perhaps unreasonable to explain this on the supposition that until such division is complete the vessels are unable to retract sufficiently to enable proper closure of their cut ends.

In the case of an aged person with atheromatous arteries, the liability to troublesome hemorrhage during operation would undoubtedly be greater. I have not yet had occasion to operate in such a case. But, even under these conditions, the experience derived from

enucleation would show that the risk of hemorrhage is not enough in itself to be a counter-indication to the performance of neurotomy.

In all cases the operation has been done from the inner side, the internal rectus divided, the stump of the opticus has been brought fairly into the centre of the palpebral opening, and the sclera denuded for a wide space about it; in all the inferior oblique has been separated from its insertion, in some the superior oblique also. Rectus reunited by suture. Usually slight divergence has resulted from the operation; in one case, where, before operation, there was a little divergence which the patient desired to have corrected, a convergence of small amount was left. The earlier cases were retained in hospital generally longer than necessary in order the better to observe their progress; the last two cases left the hospital at the end of three days.

Two cases only presented any large amount of exophthalmos; the second, in which there was a prominent staphyloma, and the patient's excitement during the night after the operation probably increased the protrusion of the eye; and the sixth. In the latter case, the exophthalmos was not so great as to prevent covering the globe by the lids; there was no special ecchymosis to suggest excessive hemorrhage behind the eye, and the greater reaction of the orbital tissues to the operation may well have been due to the extensive ahhesions which existed between capsule and sclera from previous inflammation. The ulceration of the cornea in the second case (it occurred in no other), I now think might have been avoided if the bandage had been omitted so soon as it was found the lids did not cover the globe. This same case also presents a striking illustration of the vitality of the eye remaining after so extensive a division of nerves and blood-vessels. Though the cicatricial tissue which had replaced the cornea was wholly anæsthetic after the neurotomy, yet not only the wounds of the paracentesis-needle, but slits across nearly the whole diameter of the cornea, readily united.

In Case IV. pain returned in the eye two months after the operation, with tenderness in a part of the ciliary region, but without sensibility of the cornea. It is possible that here the pain and tenderness may have been due to a rheumatic affection of the episcleral tissues—the patient had come to the hospital with articular rheumatism—it may have been, however, that a ciliary nerve, entering the eye far forward, had escaped division. Yet it might well be expected that a nerve penetrating the anterior part of the sclera would be distributed in part to the cornea, and the cornea remained anæs-

thetic. On this point the evidence is insufficient to admit a positive decision. The result of examination of the nerves entering the posterior part of the eye may fairly be regarded as evidence that there had been no reunion.

In two cases, VI. and IX., the tenderness to pressure persisted for a long time after operation, but in neither was it great; it was present too soon after the operation to be attributed to reunion of nerves, and diminished rather than increased with time.[1] In both these cases there was moderate sensibility of the cornea, but in both also the cornea was vascular. In Case IX. there was some complaint of pain, but on inquiry this was found to be in the brows, as much on one side as on the other—rather a dull ache than a pain, and seemed due to overwork of an eye with quite imperfect vision.[2]

In seven cases the cornea was transparent and free from vessels before neurotomy. In one of these, enucleation at the end of three months, for pain and tenderness in the ciliary region; cornea still anæsthetic. In three, no return of sensibility in cornea so long as they were under observation—thirty-two, twenty-nine, and six months.[3] Another case was under observation seventeen months;[4] here a touch on the cornea could be felt, but strong pressure caused no pain or discomfort, and it is possible that the touch was felt only by transmission of the impulse. In one case, XIII., there was apparently no sensibility of the cornea at the end of seven months. One, XIV., was only under observation seventeen days. Transparency was preserved in all but one of the cases.

Where the cornea was vascular, however, it always recovered its sensitiveness in part, though it became in no case so sensitive as that of the other eye. In some instances sensitiveness was probably never wholly lost at any time; certainly it was distinctly present in one case (XV.), in which both obliqui were divided and the posterior part of the globe cleared as far as the equator, three days after neurotomy, and in the others within two or three weeks. In Case VI. again, it was wholly lost for some days, at least during the height of the swelling of the orbital tissues. In some cases, observa-

[1] Later observation showed that in both these cases tenderness to pressure passed away altogether. On the other hand, in Case XV. tenderness persisted for some time.

[2] This view appears to be confirmed by the subsequent history.

[3] December, 1881. These cases have now been under observation thirty-seven, thirty-four, and ten months.

[4] December, 1881. This case has been under observation twenty-two months.

tion on this point was not so careful as to allow a positive statement whether a moderate amount of sensibility existed soon after the operation or not.

This sensitiveness of the vascular corneæ may be referred to development of nerves from the conjunctiva accompanying the vessels. That it was not due to reunion is evidenced by its early existence, and that it was not from ciliary nerves which had escaped section is shown by the fact that it was co-extensive with the vascularity. In Case XI., for instance, six months after neurotomy, the small portion of the cornea free from vessels was still anæsthetic, while in Case XV., the whole extent of the cornea being vascular, sensitiveness existed everywhere three days after operation.

The results that I have obtained in the cases above reported give encouragement to further trial of the operation, and those of some others have also been favorable. Schoeler, who first brought the operation to general notice, is, as might be expected, warmly in its favor after having performed it many times; and Schweigger, also with extended experience, says in the last edition of his handbook that, if resection of the opticus be made as he describes, the domain of enucleation may be restricted to intra-ocular tumors, and in certain cases (*eventuell*) to eyes in which foreign bodies maintain a chronic inflammation, while it should be wholly rejected for cases in which pain in blind eyes is the reason for operation. Schweigger at first expressed satisfaction with simple division of the nerves. It would be of interest to know whether he now practises resection because of some lack of permanent result from division alone among his own cases, or from theoretical grounds and because of reported cases of recurrence of pain and sensibility.

Resection must, of course, diminish the chances of reunion of nerves, but must, at the same time, make the operation to some extent a more serious one, and increase the risks of hemorrhage.

But there is another side to the picture: recurrence of pain and tenderness to pressure, and return of sensitiveness in the cornea, have not been infrequently observed, and the operation has been sometimes attended, or shortly followed, by hemorrhage sufficient to necessitate enucleation, or cause destruction of an eye pushed forward so as to be unprotected by the lids. While some of these results may be without doubt attributed to an imperfect or faulty method of operation, this explanation will by no means apply to all the unsuccessful cases reported.

Aside from hemorrhage, two dangers have been chiefly insisted

on: that some of the ciliary nerves might escape section, and that subsequent reunion of nerves might take place.

As regards the first of these, it is to be noted that Cruveilhier briefly states, that two or three ciliary nerves enter the anterior part of the sclerotic beneath the recti muscles; and again, Friedrich Arnold, writing in 1831, describes the ciliary nerves as leaving the ciliary ganglion in two bundles, an upper and a lower. "One of the branches of the lower bundle, which I found constantly present, differs importantly in its course from the rest; for, immediately after its origin from the ciliary ganglion, it leaves the other branches, inclines toward the outer side, and, after a long course through the fat of the orbit, reaches the forward part of the bulb, and perforates the sclera at that point." But he does not figure this branch in his plate. Cruveilhier's statement has been many times quoted in connection with ciliary neurotomy.

Later writers on the anatomy of the ciliary nerves in man, however, so far as I am aware, with a single exception, describe these nerves as all entering the sclera around the optic nerve and not very far distant from it. Redard [1] alone states that his dissections have shown that "one, two, or three filaments belonging to the long ciliary branches perforate the sclerotic near the muscles of the eye. One of these filaments, which is encountered almost constantly, perforates the sclerotic at the level of attachment of the superior oblique muscle. Sometimes a ciliary filament is found perforating the sclerotic immediately beneath the superior rectus muscle."

If branches of the ciliary nerves do enter the sclera far forward, they must often escape division. Branches penetrating at the level of the insertion of the superior oblique muscle would indeed be severed by a dissection of the surface of the globe, reaching everywhere as far forward as the equator; but, even in so thorough a dissection as this, nerves perforating beneath the recti muscles would probably escape.

In such case, a portion of the cornea should preserve its sensibility immediately after operation, or, if the uncut nerve have yet been numbed by stretching, sensibility should return within a comparatively short time.

The weight of anatomical evidence, as already stated, is strongly against the existence of branches of ciliary nerves which enter the sclera well forward, and the clinical evidence tends in the same di-

[1] De la section des nerfs ciliaires et du nerf optique. Paris, 1879.

rection. Whenever the posterior portion of the globe has been extensively freed from its attachment, the whole cornea (provided it was not vascular) appears to have been rendered non-sensitive.

As for the reunion of the ciliary nerves, it may be urged that, from their very small size, and from the fact that they lie in loose tissues without any firm sheath to direct their course if regeneration be attempted, it is highly improbable that this should take place. Theoretical considerations, however, are not to be relied upon to settle the question. Clinical evidence must have more force, though anatomical evidence only can be sufficient positively to decide it.

It has been generally assumed that the slow return of sensibility to the cornea, with or without pain and tenderness on pressure of the globe, gives assurance that the ciliary nerves have reunited and regenerated.

Many cases have been reported in which sensibility did return, and a lesser, but not inconsiderable number in which there was pain also.

In many of these, too, the operation seems to have been done with all thoroughness and care. It is not easy to explain this result, except on the supposition of nerve-reunion.

The difficulties of the question are not diminished by the reflection that some operators have followed up cases for long periods of time, and observed no return of sensibility, while others have seen the cornea again become sensitive in all, or nearly all, of their cases which they could subsequently examine. Unfortunately, but few have given the results of continued watching of their cases. Bunge,[1] writing of fifteen neurotomies in Graefe's clinic, states that five escaped prolonged observation; one required enucleation on account of hemorrhage (hemorrhagic glaucoma); one, on the second day, for suppuration of the globe; in one case the cornea was still anæsthetic at the end of seventeen months; the remaining seven had recurrence of pain or of sensibility of cornea. Be it said, that in one of these last pain, in one pain and corneal sensibility, returned within six weeks, a period too short to admit belief in reunion.

Hirschberg[2] operated in nine cases, always thoroughly denuding the posterior half of the globe after bringing the stump of the opticus into the middle of the palpebral aperture and dividing both obliqui; but, "after one year's observation of the cases which he

[1] Klinische Beobachtungen über die sympathische Ophthalmie. Dessau, 1880.
[2] Archiv für Augenheilkunde, IX.

had the opportunity of watching, could always prove that the sensibility of the operated globe, particularly of the cornea, had returned, whenever sensibility had been present before the operation." The last clause probably refers to sensibility to pressure; he can hardly have operated on an eye with anæsthetic cornea. He does not say how many the watched cases were.

Deutschmann[1] reports on nine cases; the eye was rolled completely forward. One patient did not appear again; one left after eight days, with not wholly insensitive cornea. In the other seven sensitiveness of the cornea returned, and in two of these tenderness to pressure also.

A case published by Léber,[2] of sympathetic ophthalmia after neurotomy, is of importance. A boy of eight years received a wound from an awl through the lower edge of the cornea into the vitreous. Loss of sight, opacity of the vitreous, and injection of the eye followed. Three months later neurotomy. The boy went to his home with slightly phthisical eye, nearly free from congestion, and anæsthetic cornea. Two years and a half afterward he returned. The wounded eye was much shrunken, hard, somewhat tender to pressure about the scar, its sensibility completely restored. In the other eye dimness of vision had been noticed for six weeks, and it presented an iritis precisely of the appearance of that excited by sympathy.

The anatomical evidence of reunion is not extensive. Poncet,[3] at the International Congress at Milan, in 1880, stated that in the dog he had demonstrated all the stages of regeneration in the ciliary nerves after neurotomy, but added, "this regeneration has, however, only been shown in the extra ocular parts (central ends?) of the ciliary nerves; it is still to be sought in the ciliary plexus and in their subchoroidal course."

Two of Bunge's cases, already referred to, were examined microscopically by Kuhnt. In one of them there was complete sensibility of the cornea seven months after neurotomy; in the other, neurotomy was done three times, and finally enucleation for pain "in the orbit" and "behind the eye," the cornea being without sensation, but the ciliary body somewhat tender on pressure. In the former of these eyes Kuhnt found one ciliary nerve in a condition indicating active regeneration, in the latter were two nerves presenting similar ap-

[1] Archiv für Ophthalmogie, XXVII., 1.

[2] Ibid.

[3] Compte rendu du Congrés, etc. Annales d'Oculistique, T. LXXXIV., p. 189.

pearances. All the other ciliary nerves were completely degenerated. Kuhnt preferred to believe that in these cases the regenerating nerves had never been divided, but only injured by stretching and contusion, a conclusion which Bunge was not disposed to share.

Finally, Hirschberg reports a case of enucleation for pain and sensitiveness after two neurotomies, from the outer and the inner side, with an interval of a month, had been performed by an experienced oculist, the eye containing a long piece of iron. He states briefly: "The uveal tract and retina were detached from the thickened and folded sclera, and the space was filled with firm connective tissue. The ciliary nerves were carefully dissected out on the inner surface of the sclera, and found histologically normal." The full force of this statement can scarcely be intended, for then it would appear that, in the space of eleven months which had elapsed since the second neurotomy, all the ciliary nerves had reunited and undergone entire regeneration—a result which would seem incredible, particularly when the condition of the globe is considered.

Admitting the occasional reunion of ciliary nerves, is it necessary to assume this in every instance in which sensibility of the cornea returns? When the cornea is vascular it need not be necessary. But if the cornea be free from vessels? Writers on the nerves of the cornea agree in the assertion that these nerves are derived in part from the conjunctival nerves. Would it be venturing too much to suppose that in some cases, after division of the ciliary nerves, an increased development of the branches derived from the conjunctiva occurs?

On the other hand, it is difficult to understand how, if the corneal nerves are derived partly from the conjunctiva, the whole cornea should remain anæsthetic for a long time, or even permanently, when only a limited portion of the connection between conjunctiva and cornea has been severed by the operation.

Leber's case of sympathetic ophthalmia after neurotomy is regarded necessarily as furnishing a strong argument against the operation. It is true this is but a single case, and there have been hundreds of neurotomies, and it is, of course, *possible* that the inflammation in this case may not have been aroused by sympathy. It is also true that within a few years a number of cases have been reported, in which the first symptoms of sympathetic inflammation showed themselves days or weeks after an uncomplicated enucleation. But it is to be remembered that not very infrequently eyes have been enucleated subsequently to neurotomy, on account of symptoms which were be-

lieved to point to a condition threatening danger to their fellow-eyes.

Despite all the arguments that have been brought forward against optic ciliary neurotomy, it seems to me to offer sufficient advantages to make its employment not only justifiable, but advisable in many cases.

It is yet too early in the history of the operation to define with precision in just what cases neurotomy may be substituted for enucleation with prospect of gain for the patient, and the indications of the individual case must always influence the decision.

At present I am disposed to limit its employment within somewhat narrower bounds than those proposed by Schweigger, as above quoted.

REMARKS.

DR. CHAS. J. KIPP, of Newark, N. J., asked if there was evidence of sympathetic trouble in either eye.

DR. WADSWORTH replied that there was no sympathetic trouble in the other eye, except in the eighth case, beyond sympathetic irritation.

DR. KIPP asked if there was any question with regard to the return of corneal sensitiveness.

DR. WADSWORTH replied that when the cornea was not vascular it did not return, so far as he knew, except to a slight degree in one case. In all the cases in which there was vascularity of the cornea, there was some sensitiveness of the cornea found shortly after the operation.

DR. BULLER, of Montreal, referred to a case treated some time ago, and in which he was content with partially performing the operation. An old lady had a painful cicatrix occupying the upper part of the cornea upon which vesicles formed, and the pain was intolerable while they were forming. She had been under various forms of treatment for about a year, and he treated her with every remedy of which he knew, and supposed would give her any relief. He finally recommended cutting the ciliary nerves at the upper part of the eyeball, which was accepted. There was a certain amount of vision. The operation had some effect, as the cornea was partially anæsthetic, and she seemed to receive some benefit from it for two months; but then the pain began to return, was as bad as ever, the entire cornea underwent the same process of vesication, and finally he enucleated the eyeball.

THE PRESIDENT remarked that v. Graefe had done the same thing.

DR. BULLER further remarked that he had performed neurotomy in three other cases with satisfactory results. In the last case sympathetic ophthalmia was threatening, and he performed the operation

in the usual way, there was considerable hemorrhage afterward, and there was further hemorrhage during the night; when he saw the child the next morning there was acute inflammation all around the eye, and in the course of three days the entire eye underwent purulent inflammation, the cornea broke down, and the eyeball shrank. There was suppurative panopthalmitis. It was a result which he had not seen mentioned.

DR. WADSWORTH, in answer to questions, said that he divided the inferior oblique muscle in every case—the superior oblique in some cases; that no portion of the optic nerve was removed; that the eyeball underwent atrophy to some extent in the first case in the course of a few months, but none since; that, in those cases in which the eyeball was somewhat shrunken before the operation, the shrinking continued somewhat afterward; but that the two eyes which presented the best globes and were the least affected before the operation, did not change afterward except as to diminished tension, which was present in all the cases as a permanent result.

THE PRESIDENT said that he had performed the operation perhaps five times, but not in the manner described by Dr. Wadsworth. He had divided the optic nerve by going in at the supero-internal angle of the orbit, between the rectus superior and internus, had not cut any muscle, and had usually succeeded in cutting from the nerve a piece from seven to nine millimetres in length. Consequently the operation had been a true neurectomy, but the posterior portion of the globe had been exposed, the globe rotated completely upon its axis, and every vestige of nerve and vessel cut away. He could confirm Dr. Wadsworth's statement with regard to hemorrhage. In his cases the exophthalmus had not been troublesome, and no special deformity had followed the operation. In the majority of cases it had been succeeded by marked reduction in the size of the eyeball, especially where phthisis bulbi had already set in.

In none of the cases had sympathetic irido-choroiditis declared itself, but there were symptoms of irritation. The operation was performed on account of the unpleasant prospect for the fellow-eye, caused by the irritability of the eye operated upon. His own feeling had been that the operation was of very doubtful propriety. He was very glad to have the opportunity of hearing the report of Dr. Wadsworth's cases, as perhaps it might be found that his method of operating was preferable to that employed by himself, and also by Dr. Knapp, because, inasmuch as he (Dr. W.) exposed a greater area of the posterior part of the globe, he perhaps secured a greater possibility of including all the twigs of the ciliary nerves.

THE PRESIDENT suggested that, in operating hereafter, the globe be attacked from the outer side, and that the external rectus be divided so as to come up on the outer side of the optic nerve, and that it be divided at the apex of the orbit. The reason was that the ciliary ganglion was usually situated here; and if we could get behind the origin of the nerves, there was a better chance of securing the desirable results. Hereafter he should operate on the outer side of

the globe, and should attempt to secure the ciliary ganglion. He did not think that the dangers of the operation were of material importance, and had been rather surprised in that respect. Yet he had seen sensitiveness of the cornea return when it was not vascular, and he had seen shrinking of the globe to a degree which entirely set aside the cosmetic advantages of the operation, and he had been doubtful about its ability to secure protection against sympathetic trouble in the other eye.

DR. S. D. RISLEY asked to what extent the cornea was transparent and the mobility of the eye retained.

DR. WADSWORTH answered that the mobility of the eye was good in every case, except so far as this—there was a slight diminution in the amount of fixed rotation inward. There was no large amount of divergence, except in one case, where the suture did not hold.

With regard to the return of sensitiveness in the cornea, theoretically it seemed to him more natural to suppose that it was due to reunion of the ciliary nerves than to increased growth of nerves from the conjunctiva. All writers stated that part of the nerves of the cornea were derived from the conjunctival nerves, and yet we did find that, after dividing the ciliary nerves behind the eye, the cornea was usually anæsthetic, and in his cases it remained so. But suppose sensitiveness to return, it did not seem to him unreasonable to attribute it to the increased development of the conjunctival nerves, which naturally entered the cornea. Ranvier had demonstrated, and others had repeated the experiment, that section of ciliary nerves entering the cornea, caused non-sensitiveness of the cornea in different sectors, and that the distribution seemed to be to parts radiating from the centre. But he believed that sensibility had not returned in that manner. That some of the ciliary nerves should reunite, would not be specially curious; but that all of them should reunite seemed to him to be a conclusion which should have strong anatomical proof before it was fully accepted.

THE PRESIDENT had seen cases in which sensitiveness returned over a small segment of the cornea while the remainder was non-sensitive.

DR. WADSWORTH remarked that that fact would point more to reunion, or it might be that some nerve remained undivided.

ON SOME THERAPEUTICAL APPLICATIONS OF PILOCARPINE.

By JOHN GREEN, M.D.,

ST. LOUIS, MO.

A SOMEWHAT extended use of muriate of pilocarpine as a local application to the eye, during the past two years, has seemed to me to justify the expression of the belief that it deserves a place among our more valued remedies in ophthalmic therapeutics. The preparation which I have used is that of Merck, of Darmstadt, and I have prescribed it in aqueous solution, usually of the strength either of two grains or one grain to the ounce, to be dropped into the eye from a glass dropping-tube, which gives out a drop equal to about one-half minim for each instillation.

In asthenopia of young persons, unconnected with any considerable grade of ametropia, and in which pain or a sense of fatigue is the prominent symptom, I have for fifteen years followed the suggestion of our colleague, Dr. Ezra Dyer, to exercise the eyes systematically by reading daily for a prescribed number of minutes, and increasing the time of reading as may be found practicable.[1] Comparing my recent with my earlier experience of this very valuable plan of treatment, I feel sure that my success has been materially enhanced by conjoining with it the systematic use of pilocarpine. I prescribe a solution of the strength of two grains to the ounce, to be dropped into the eyes at bed-time, and in some cases also in the morning, at the same time giving careful instruction as to the kind and amount of eye-work, generally reading, which is to be done daily. In no case is this reading to be begun during the continuance of the primary myotic action of the pilocarpine, but only after the lapse of two or three hours if the instillation has been made in the morning, or early in the day if it has been made at bedtime. In carrying out this plan, I have had in mind to alternate the daily voluntary exercise of the accommodation with a passive exercise

[1] Dyer, in Trans. Am. Ophth. Soc., 1865.

of the parts concerned in that function, as induced by the moderate but systematic use of the myotic agent, in the belief that the organs thus passively exercised may thereby become more readily and freely responsive to the impulse of the will.

In some cases of persistent hyperæmia of the conjunctiva or of the lid-margins, predisposing to inflammatory conditions, and impeding recovery when inflammatory conditions are present, and in which the relief afforded by the wearing of judiciously selected glasses, or by the adoption of a course of treatment by mydriatics, seems to enforce the conclusion that impaired or overtaxed accommodation is an important factor in the case, I have employed pilocarpine in the same manner as in the cases of asthenopia just mentioned, and with results which have seemed to me to justify the belief that it is often a valuable adjunct to the remedies usually employed.

In cases of impairment of accommodative power, induced by causes transient in their operation, but in which the accommodative disability may continue after the exciting cause has ceased to act, the indications for myotic treatment are obvious. I have used pilocarpine with manifest advantage in cases of premature presbyopic vision, especially in hypermetropes, developed in connection with some acute illness; also in the accommodative paresis following diphtheria, and in cases of accommodative weakness of undetermined origin, but in which hypermetropia, if present, had not previously interfered with the free use of the eyes in reading or study. In these classes of cases, which are characterized rather by inability to read than by pain, and in which immediate and perfect relief is afforded by convex glasses, I have used the pilocarpine solution several times a day, but often of a strength of not more than one grain to the ounce, aiming to maintain throughout the day a moderate myotic effect, sufficient to make reading comparatively easy, but still to leave something to be accomplished by voluntary effort. Used in this way, pilocarpine has rendered me good service in a class of cases in which, formerly, I should have thought the use of convex glasses essential.

In the earliest stages of strabismus convergens, especially when the deviation is not connected with any considerable degree of hypermetropia, a continued course of myotic treatment may be indicated. In such cases the myosis should be maintained as uniformly as possible by repeating the instillation several times in the day, and, as I think, preferably by the use of pilocarpine, which is more easily manageable than eserine, and nearly free from tendency

to give rise to painful spasm of accommodation. I have as yet had no opportunity of subjecting pilocarpine to satisfactory tests in incipient strabismus; but in convergent squint, recurring after a temporarily perfect correction by tenotomy, I have used it with very positive advantage, both by itself and in connection with convex glasses.

The suggestion that an artificial myosis, continuously maintained, may have a beneficial tendency in strabismus convergens, is contained in a paper which I read before this society in 1870,[1] in which I especially advocated the free use of mydriatics in the early stages of this affection, for the purpose of fully suspending the accommodation, and so doing away with the ordinary motive to excessive convergence. The suggestions contained in that paper have been lately reproduced by a French colleague with singular exactness, but, unfortunately, with greatly exaggerated statements regarding the practical efficiency of both the mydriatic and the myotic plans of treatment. Mydriatics are now quite generally recognized as among the useful agents in the treatment of strabismus; myotics are, I believe, destined also to take a place in the same category, but one of very subsidiary importance.

In phlyctenular and vascular affections of the cornea, with photophobia as a prominent symptom, I have met with a few cases in which the usual mydriatic treatment by atropia has been attended with an increase of the trouble, and in which a change to pilocarpine has proved to be of immediate and signal benefit. I am unable to distinguish these cases by any characteristic signs from the great mass of similar cases in which atropia has rendered good service. I have used the pilocarpine solution of the strength of two grains to the ounce, beginning with from three to six instillations daily, and gradually diminishing the number as the case has progressed toward a cure. Other treatment, such as the usual applications to the tarsal conjunctiva, the use of Pagenstecher's ointment, the insufflation of dry calomel, etc., has generally been used, as has seemed to be indicated, in conjunction with the pilocarpine.

In a case of glaucoma beginning to develop in the second eye, in which the instillation of eserine sulphate (gr. ij.–℥ j.), although somewhat painful, had been attended by a positive amelioration of the symptoms, I have substituted pilocarpine instillations of the same strength, with even better effect, as marked by visual improvement, and with the advantage of complete exemption from pain.

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[1] Green, in Trans. Am. Ophth. Soc., 1870.

Taken together, the good results which have followed the local use of pilocarpine in the affections mentioned have appeared to me to be of sufficient importance to encourage its more extended employment. Such testimony as I have felt justified in offering is, necessarily, of a very general character, and encumbered by a very large personal equation, which, however, no citation of individual cases would materially help to eliminate.

REMARKS.

DR. S. THEOBALD, of Baltimore, had been inclined to use pilocarpine in those cases in which eserine had been more especially recommended, inasmuch as eserine had often caused conjunctival irritation. He referred to an old case of glaucoma, in which a solution of pilocarpine—one grain to the drachm—was used for a long time with benefit, giving relief from pain.

He had also used it occasionally in corneal troubles, especially ulcers, and had always found that it produced just as soothing effect as did atropia, and the progress in some cases seemed to be more favorable than while atropia was being used.

DR. RISLEY asked concerning the pain caused by pilocarpine in comparison with that produced by a like solution of eserine.

DR. GREEN answered that the discomfort produced by pilocarpine was insignificant, certainly much less than that caused by eserine; it had never amounted to pain.

DR. THEOBALD had not seen cases in which pain had been produced by pilocarpine.

THE SO-CALLED CURE OF CATARACT BY ELECTRICITY.

BY H. D. NOYES, M.D.,

NEW YORK.

WE have already heard of the excitement created by the statement that cataract could be cured by electricity. Very much of that stir was aroused by the experience which befell one of my own patients. She fell under the care of a gentleman who promised large results from the use of electricity, and who treated her from six to nine months. She has since returned to my notice, and I am able to state the condition of things from the beginning of the use of electricity, and compare her former with her latter state.

The patient was a lady, seventy-five years of age, who had been

much worn by attendance upon her husband during a protracted illness which ended in his death. He had been blind from cataract for some time. In January, 1879, Mrs. —— asked me to examine her eyes, and I found O. D. +24„ V. = $\frac{20}{100}$; O. S. +36„ ⊂ +60c., 180°; V. = $\frac{20}{70}$. Both pupils were extremely small, and, not deeming it desirable to use atropia, I saw with the ophthalmoscope in the right eye a striated and diffused opacity confined to a limited sector of the lens on the infero-external side. In the left eye a less number of striæ were found on the infero-external side of the lens. The fundus could be seen very dimly, and the choroid seemed to be pigmented more deeply than usual in the intervascular spaces. She was directed to use +6„ as a reading-glass. In September, 1879, the same ocular appearances were noted, and vision was the same. The prediction was given that she was not likely to become wholly blind, but that she would have continued dimness of sight.

Soon after this she put herself in the care of a gentleman who proposed the cure of cataract by electricity. My knowledge of his proceedings is obtained from her statements. He instituted a careful hygienic regimen: in daily exercise, in requiring her to drink no other fluid than Vichy water, and to take magnesia at night several times weekly. He gave directions as to food, and used the constant galvanic current for a few minutes about the temples and eyeballs, two and three times weekly. He did not promise any hope of improvement until after six weeks. As the precursor of the happy change he said there would be a brightness over her eyes during or immediately after the galvanic seance. This phenomenon did occur to the lady, and thereupon better sight ensued. The galvanic treatment was kept up for several months, and the hygienic measures maintained. She got rid of dyspeptic symptoms, grew stronger, and improved in sight, to her own consciousness, to a marked degree. The change was in the removal of a fogginess which formerly enveloped and cast a veil over everything. She could see to read better, could recognize her friends with greater ease, and the principal gain was that she could walk the street with confidence without a guide. The improvement was real, and greatly delighted herself and her friends. But she was not restored to good vision, and the treatment was abandoned, although what had been gained was credited to the galvanism. In June, 1881, twenty-one months after my previous examination, I saw her again at my office. She was looking more brisk and cheerful than formerly, and came to my office on foot and alone, which in 1879 she would not have done.

Her vision was as follows: O. D. +16„ V. = $\frac{1}{100}$? O. S. +16„ $\frac{1}{200}$ + with +6½„ reads S. 6 at 10″. Pupils very small.

About two weeks after this I used atropia and examined with the ophthalmoscope. In the right the opacity of the lens was just as it had been two years before, and in the left there was a discernible increase in its extent. But in both lenses the greater part was quite clear. The vitreous of each eye was clear, but in each there was a notable and similar lesion of the choroid and retina. This consisted in the destruction of the hexagonal pigment-epithelium and fine choroidal vessels over an area which reached from the optic disc to a point beyond the macula lutea, and was of an elliptical shape, its long axis horizontal. On this area the choroidal vessels were exposed to view, some specks of pigment-deposit were scattered over it, and its border was marked by a deep pigmentary line; the sclera was laid bare in small spots. Beyond this space no trace of the choroidal vascularity could be seen. Jaeger (*Beiträge zur Pathologie des Auges.* Taf. ix.) gives a plate of this appearance, which is a low grade of chorio-retinitis. I found that there was a central scotoma in each eye—that in dim light her sight grew suddenly and disproportionately bad. But she told me that she was no longer enveloped in the fog which was her former most distressing symptom. I found her vision apparently better than at the examination two weeks before, although she was not conscious of any change. I got the following statement: O. D. +24„ V. = $\frac{8}{10}$? O. S. +24„ V. = $\frac{2}{100}$. Evidently she had become more familiar with the type, and on this day there was bright sun in my office, while the day two weeks before was cloudy. The difference in light evidently counted very greatly in her favor.

What, now, was the true explanation of the case? Obviously there was chronic and limited choroido-retinitis and incipient cataract. Accompanying this lesion was, in the beginning, diffused haziness of the vitreous. The most important factor in the disturbance of sight had evidently been the cloudy vitreous. When this cleared up, better sight ensued, and the lens opacities were so small and so limited that they were of small detriment; but the lesion of the fundus about its central space was the chief remaining cause of the damage to vision. Galvanism had not cured nor arrested the cataracts, but the opacities of the lenses had to a slight degree advanced, as my diagrams testify. While galvanism was being used, and while rules of hygiene and dietary regulations were being skilfully enforced, the vitreous cleared up, but the choroido-retinal disease went

on. The latter lesion may be assumed to have attained its maximum within the first eighteen or twenty-four months. This includes the period from the time when I found the disease to the time when improvement of sight ceased to advance. She says that for the last year there has been no change for the better. Further comment seems needless. The claim of galvanism to cure cataract utterly falls to the ground, while it is not pretended that it cures vitreous opacity nor choroido-retinitis. It is a well-recognized fact that the lesions described undergo the above-mentioned changes and evolution. That, given the well-applied measures to improve health, and the time which elapsed, just such results may be gained without any galvanism.

I have seen another case of cataract, in a man seventy-two years of age, who also had diabetes mellitus, and who submitted himself for four weeks to tri-weekly applications of the constant galvanic current. A severe attack of suppurative keratitis, with ulceration of the cornea and iritis with adhesions, was the consequence. No impression was made on the cataract. I afterward extracted the lens, which was very large and amber-colored. The opacity on the cornea, caused by the keratitis, extended over the pupil and reduced the degree of sight possible to be obtained.

PULSATING EXOPHTHALMOS.

By H. D. NOYES, M.D.,

NEW YORK.

I BEG to relate a case of pulsating exophthalmos, which differs in method of treatment from any upon record. A girl, born in Ireland, had an attack of some kind of fever four years ago, by which she was kept in bed four weeks. While convalescing she was suddenly taken with a pain upon the left side of her head and about the region of the left eye, the globe began to protrude, and within one week projected to a conspicuous degree, without inflammatory disturbance. During the four years following the attack the eye remained about the same, except that she suffered from occasional attacks of fugitive inflammation. While passing through Limerick, on her way to America, she had a severe attack of inflammation, which continued on shipboard, and she was treated for granular lids. She landed in New York, and came under my observation at the Eye and Ear In

firmary. I found slight swelling of the lid, considerable chemosis, but no granular lid, and the globe protruded to a marked degree. At the inner and lower angle of the orbit there was a projection, which at first deceived me into the belief that it was a solid growth. I felt a pulsation about the mass, however, and proposed an operation for the removal of the tumor. I put the patient under the influence of ether, and it then soon turned out that the apparent tumor was a distended blood-vessel, pushing forward at the inner and lower angle of the eye, and I then suspended proceedings in order to give time to decide what was best to be done. In the course of two days I put her under ether again, prepared to perform whatever operation seemed to be required. Careful examination had elicited the following symptoms: there was a long, tortuous vessel coming from the inner and lower angle of the orbit forward, and returning with a loop, and entering the orbit was what seemed to be an exceedingly large branch of the angular artery. A *bruit* was heard over the exophthalmos, but not upon the temple—distinctly heard by three persons, and not heard by two others. Pressure upon the carotid completely stopped pulsation in the enlargement, but it had no effect upon the protrusion of the globe. All this led to the belief that it was a purely vascular anomaly; and not being then willing to resort to the grave operation of ligating the carotid artery, and not making a clear diagnosis, I decided to do two things: first, to ligate the angular artery, and second, after the ligation of the vessel, to dissect down upon and trace this tortuous vessel, and tie it off. That operation I undertook, and, although it was exceedingly difficult, I finally succeeded in ligating the angular artery. Here I may say that I found the large, ordinary instruments totally inadequate to surround the vessel, and succeeded in encircling it by using a slender hook similar to a strabismus-hook.

Having ligated the angular artery, I cut down upon the protruding vessel, which was as large as a medium goose-quill. I traced it down, putting on ligatures one after another, and cutting between them, and demonstrated that it was a vein, and I finally tied it at the spheno-maxillary fissure. I then had the conviction that it was the inferior orbital vein coming out from the spheno-maxillary fissure and going back into the cavernous sinus. The wound was closed, no remarkable reaction occurred, and at the expiration of six weeks all the exophthalmos had disappeared. There was no return of the pulsation, and the protrusion of the globe had been completely cured.

The diagnosis came by way of inference. I think that the pri-

mary lesion was a communication between the carotid artery and the cavernous sinus, which was followed by distention of the inferior orbital vein. My ligature must have caused a clot to form up to the cavernous sinus, and have shut up the aperture of arterio-venous communication.

Without interfering with the circulation in other directions, I succeeded in curing a pulsating exophthalmos by a local operation, which is not recorded to have been done in any of the cases collected by Sattler, who has written the last *résumé* of this subject in Graefe and Saemisch. A resort to ligation of enlarged orbital vessels has been done several times after having ligated the carotid, but in my case the cure was effected without touching the carotid. The superior orbital vein is the one usually distended in these cases, and my case must be noted as exceptional in this regard.

REMARKS.

DR. S. D. RISLEY, of Philadelphia, referred to a case of pulsating tumor of the orbit, which had an aneurismal *bruit*. The *bruit* disappeared, and the case, at present, seemed to be one of aneurism, or at least vascular tumor, which had undergone spontaneous cure. The case illustrated the difficulty, in some cases, in reaching a correct diagnosis.

DR. W. H. CARMALT, of New Haven, in this connection, referred to a case of traumatic arterio-venous aneurism between the carotid artery and the cavernous sinus, occurring in a man who had fallen from a wagon and struck upon his head. He was picked up unconscious, but recovered sufficiently to be about within fourteen days, or, as he called it, recovered his consciousness. He was then aware, for the first, of a pulsating noise upon the opposite side of his head, that lasted for about four months, when he first noticed diplopia, and subsequently there was protrusion of the eyeball. Three weeks afterward he had moderate exophthalmos, with congested conjunctiva and diplopia, due to paralysis of the external rectus alone. There was no pain, but he was conscious of this pulsation. A pulsation was found in the deep part of the orbit, and a bruit was perceptible over the eyeball and down alongside of the head and the carotid artery. His vision was perfect, as was also his accommodation. Ophthalmioscopic examination revealed only marked enlargement of veins. The fact of good vision, also diplopia due to paralysis of the external rectus alone, with propagation of the *bruit* over the carotid artery into the neck, enabled Dr. Carmalt to reach the diagnosis that the trouble was in the usual form of rupture into the cavernous sinus. By pressure upon the carotid artery, the bruit could be controlled entirely. Although at first it gave rise to slight dizziness, he did not notice it any more. He then determined to try digital compression upon the internal carotid artery, and it was kept up for twenty-four

hours by relays of nurses, during which time he heard no pulsation at all. At length one nurse failed, and during the last hour he again heard the *bruit*. The attempt was then abandoned, but renewed in the course of two or three days, in the form of intermittent digital compression, and for three days he maintained compression for ten minutes every hour. The result, however, was not very marked, only slight improvement taking place. The patient suffered actually but little, and was becoming accustomed to the *bruit* and the diplopia, and Dr. Carmalt did not feel justified in ligating the carotid artery.

DR. GEORGE C. HARLAN, of Philadelphia, some years ago reported a case somewhat similar to Dr. Carmalt's, and he carried out very much the same plan of treatment for thirty-six hours, and with a certain improvement. The man learned to make compression himself, and constructed an apparatus for that purpose, and whenever he had opportunity to apply compression he did so, and at the end of eighteen months the exophthalmos was almost entirely gone, and all annoyance from pulsation in the head had disappeared.

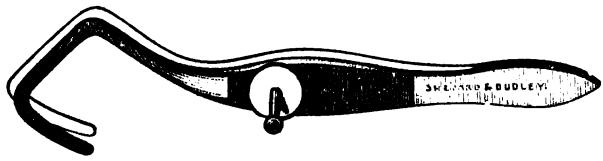
At the autopsy, finally obtained, there was no positive evidence of aneurism of the orbit.

MODIFICATION OF SNELLEN'S FORCEPS FOR ENTROPION OPERATIONS.

BY H. D. NOYES, M.D.,

NEW YORK.

A YEAR ago Dr. Green spoke of a mode of treating entropion with satisfactory results. I have found myself aided in performing that operation by using Snellen's clamp-forceps—of which both blades are made alike—for turning the lid over and holding it in the desired



position. By using this clamp you have the advantage of having the edge of the lid perfectly exposed between the blades, and the instrument offers a means of rendering the operation much less prolonged and annoying than when performed without it. This clamp has also served a good purpose in holding the reversed eyelid, during the removal of tarsal tumors, through the conjunctival surface.

REMARKS.

DR. J. S. PROUT, of Brooklyn, said that he had performed the operation mentioned by Dr. Green, with very satisfactory results. Exactly how it accomplished the result he was not able to say, but he had always taken pains to evert the edge of the lid so as to make it go through the arc of a circle of 108°. In one case operated upon several years ago, where there were no ciliæ, relief followed, and there had appeared a fair row of ciliæ in each edge.

In the first operation which he performed, he found it exceedingly difficult to hold the edge of the lid in proper position, but subsequently it was much easier. He had found that a probe-pointed knife possessed special advantage over scissors for making the incision.

DR. GREEN remarked that he had had a variety of experience in the use of clamps with which to hold the edge of the lid, but had finally disposed of all of them. He did not believe there was any need of clamps, and thought there was some danger in their use. At the same time the instrument exhibited might aid those who had not had much experience in performing the operation.

A PULSATING TUMOR OF THE ORBIT.

BY HENRY S. SCHELL, M.D.,

PHILADELPHIA, PA.

ARTHUR WATERMAN, a farmer, aged fifty-nine, was first seen February 4, 1881. His left eye was then blind and pushed outward and downward, the lids red and swollen, the conjunctiva chemosed, and he was suffering such severe pain in the organ that the acuteness of vision in the other eye could not be determined. He stated that his present condition had lasted already for two weeks, and that for several days there had been a discharge of matter from the eye. The ball was fixed, —T. 2. At the upper inner angle of the orbit there was a slightly pulsating tumor, which gave an indistinct feeling of fluctuation upon palpation, and over the apex of which the skin was evidently attenuated.

The local pain was so severe that it was found necessary to administer an anæsthetic in order to complete the examination. After the patient was fully under the influence of ether, the pulsation of the tumor became very marked; the swelling was found to be some-

what compressible, and it became soft, and the pulsation ceased when the left common carotid was pressed upon. An exploring-needle, introduced to the depth of nearly two inches, at the most prominent part of the swelling, brought forth nothing but blood. Before the administration of ether it had not been possible, owing to the restlessness of the patient, to examine the right eye with the ophthalmoscope. The instrument was now used, however, as the patient lay unconscious, and there was found a well-marked choked disc in both eyes.

From the patient's son it was now ascertained that diplopia had occurred two and a half months previously, and had remained while sight lasted in the affected eye. Also that for two or three weeks the patient had been troubled by occasional attacks of nasal hemorrhage and of nausea.

Two days after the patient was first seen his gait became tottering; he was able to walk a few steps only, and his mind commenced to wander. His pulse and temperature remained nearly normal until the last. On February 24th he became hemiplegic on the right side, and on the 26th he died.

A post-mortem examination, made the next day, disclosed a quadrate, almost globular tumor, nearly filling the left side of the anterior fossa of the cranium. It was found to be continuous at its anterior border, through a perforation of the orbital plate of the frontal bone, with a mass which filled the orbit. The dura mater covering the superior surface of the brain was thick, congested, and opalescent; the veins full of black blood, and along several of the larger ones, especially those running up from the fissure of Sylvius, was a linear deposit of whitish yellow matter, with corpuscular bodies interspersed. On the lower surface of the brain there was effusion of blood and lymph, between the arachnoid and the brain-surface. There was a small abscess, containing creamy pus, at the anterior outer portion of the left lobe. The whole interior of the anterior lobe, on the left side, was in a condition of yellow softening, which, in the region of the lateral ventricle, reached back to the middle of the brain. The cerebral substance was everywhere very vascular. When the tumor was laid open, it proved to be about the consistence and appearance of hepatized lung. A microscopic examination showed it to be a glioma. Sections of the optic nerves on both sides proved the choking of the disc to be due to interstitial neuritis, the connective tissue between the bundles of nerve-fibres being swollen to twice or thrice its normal dimensions. This was ap-

parently the result of contiguity to the tumor. Although the anterior lobe of the cerebrum, on the left side, including the third frontal convolution, was almost diffluent, the faculty of speech was preserved to the last.

A NEW TRIAL-GLASS FRAME.

PRESENTED BY S. D. RISLEY, M.D.,

PHILADELPHIA, PA.

IN the spring of this year, having occasional need in my office of a trial-frame in addition to my optometer, I directed the attention of my assistant, Dr. B. Alexander Randall, to the matter of devising one more satisfactory than those generally obtainable. Of those up to that time brought forward, none afforded a practically convenient means of accurately centring the lenses—one feature of the optometer which has proved specially valuable. As the result of his work, I present this frame as affording advantages over any that I have seen.

The requirements in the matter deserve a passing notice. The distance between the pupillary centres varies greatly, being nearly seventy millimetres in some adults, while in children old enough to be subjected to the test with trial-lenses it is often less than fifty millimetres. A movement of sixteen millimetres, at least, is therefore necessary to secure approximately accurate centring. The height of the centres is also important, and some provision should be made for its adjustment. Provision must be made for carrying two glasses, at least, in combination, while provision for a third, even if not necessary, is most convenient.

The only frame that has come under my notice, having these adjustments in any adequate degree, is one in which the semicircles for the reception of the lenses opening downward slide beneath a horizontal bar. To hold the lenses in place, a spring is necessary —a spring that is never in order, even in its best form, either too weak, or else so strong that a glass cannot be introduced or withdrawn without steadying the frame with the hand. An adjustable bridge has also been attached to the bar, but in a form that is of no real value; and, as a whole, the frame has seemed to me much too cumbersome for convenient use. The frame presented by Dr. Green at the last meeting of this society affords a centring adjustment, inadequate, however, in degree, while his frame and my op-

tometer are the only ones which I have met allowing the employment of more than two glasses in combination.

In the new frame the cumbersome bar of the frame first alluded to is replaced by a little block of truncated wedge shape, which forms the centre of the instrument. Through a rectangular mortise 3 mm. in width by 4 mm. in height, perforating this block from side to side, two narrow bars 22 mm. long slide horizontally past each

Fig. 1.

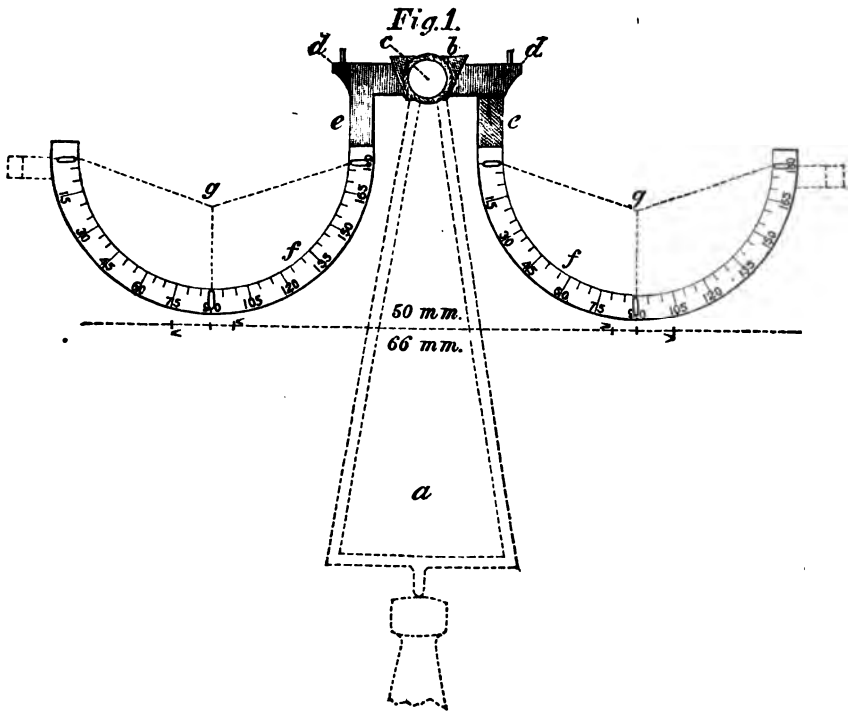


FIG. 1 shows the instrument arranged with the handle. The handle, *a*, fits into grooves on the face of the central block, *b*, and is secured by the screw, the milled head of which is shown at *c*; *d*. *d*, are the horizontal bars, sliding past each other through the central block, and *e*, *e*, are their vertical prolongations downward to the graduated semicircles, *f*, *f*; at *g*, *g*, are shown the hooks which give the third spaces for the lenses. The lettering is the same in all the figures.

other, all other movement being prevented by the close fit of the mortise. Each of these bars, bending at right angles, passes vertically down to become continuous with a graduated semicircle with its concavity upward, which is to hold the trial-lenses. Each semicircle consists of a half-tube 7 mm. in length and 35 mm. in internal diameter, with a groqve near its anterior and posterior surfaces respectively for the reception of the flanges of the trial-lenses, while

the equivalent of a third groove is furnished by a set of three hooks upon its front. The ridge between these grooves is 3 mm. broad, and is the exact continuation in position and size of the vertical arm, which is twice the breadth of the horizontal bar.

We have, then, the graduated semicircles suspended by the vertical arms from the horizontal bars, and capable of being approximated or separated by the movement of these bars through the central block. This block, as stated, is of truncated wedge shape, 5 mm. in breadth below, and 10 mm. above. The vertical arms and the semicircles they support can, therefore, be brought to with-

Fig. 2.

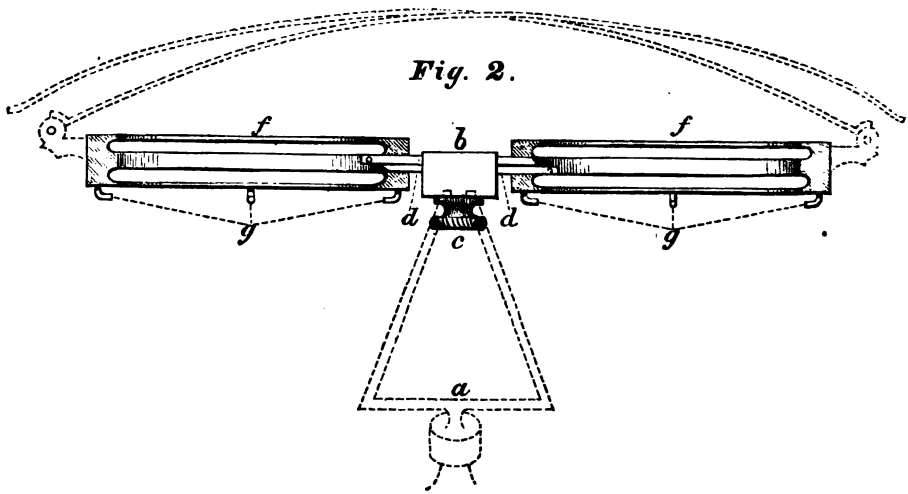


FIG. 2 shows the instrument from above, and indicates at once the arrangement of the handle and of the bows.

in five millimetres of each other, being held apart only by the lower part of the block. They can again be separated widely, limited in this direction by a little pin near the extremity of the upper surface of each horizontal bar. Each bar has thus a movement of 8 mm., and the distance between the centres of the graduated arcs can be varied from fifty to sixty-six millimetres, this being deemed sufficient. Any further amplitude could readily be obtained by increasing the length of the bars. As the horizontal bars correspond to the spaces between the grooves of the arcs, they do not interfere, even when centring at the narrowest, with the glasses placed in these, except when a very thick lens is placed with its prominence backward in the anterior groove. Any necessity for this is avoided by the use of

the hooks in front, except when three very thick lenses are simultaneously employed, with the frame at its narrowest. Then a little adjustment is necessary to place or remove the middle glass, but 20 $D^s = -8$ $D^c = Pr.\ 15°$ can be thus used—a combination never exceeded, even in Dr. Green's combination sets of lenses, for which, therefore, this frame is admirably fitted.

The frame was designed to be used with a handle like that of the binocular ophthalmoscope of Geraud-Toulon; and this will probably be found the best way to employ it. If the patient sit in an arm-chair, it requires hardly any effort to hold the frame in position, the

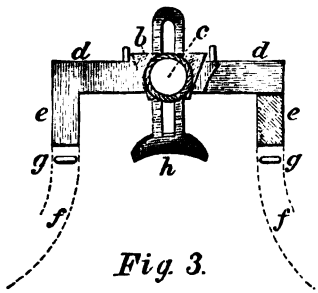


Fig. 3.

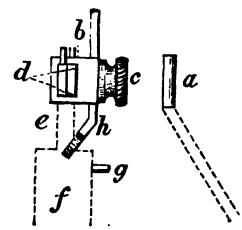


Fig. 4.

FIGS. 3 and 4 show the shape and arrangement of the adjustable bridge, *h*.

elbow resting on the arm of the chair. Where preferred, however, the bows of the ordinary frame are readily substituted; or, as in the instrument here presented, added so as to be easily detachable—so that it may be employed in either way. When used with the bows, the adjustment for height, so readily made by the patient's hand in the other case, has to be sometimes substituted by a mechanical contrivance. Only when centred very widely is this at all necessary, as the semicircles themselves generally rest upon the sides of the nose and hold the frame firmly in position. An adjustable bridge has therefore been added, carried by a slotted bar moving vertically in the same grooves and secured in any position by the same binding screw which would hold the handle, were that employed. This bar is bent backward at an angle of 45°, so that, while adjustable to any height vertically, its pressure always comes nearly at a right angle to the line of the nose, and it has therefore little tendency to slip. It is very readily adjusted, and, even when not necessary, makes the position of the frame more accurate and secure.

[NOTE. The instrument presented is made by Mr. Ivan Fox, Optician, 1632 Chestnut Street, Philadelphia.

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CONTENTS.

PAGE

MEMBERS OF THE SOCIETY..... 323

MINUTES OF THE EIGHTEENTH ANNUAL MEETING 327

In Memoriam—DR. EDWARD REYNOLDS 334

Pulsating Vascular Tumor of Orbit, Eyelid, Temple, and Forehead, Treated by Electrolysis (with woodcuts). By CHARLES STEDMAN BULL, M.D., New York 335

Atrophied Remains of the Hyaloid System Attached to the Posterior Pole of the Lens and Detached from the Papilla (with woodcut). By W. W. SEELY, M.D., Cincinnati, O..... 344

Serous Effusion into the Vitreous. By W. W. SEELY, M.D., Cincinnati, O. 345

Apparent Disappearance of Iris after Extraction of Cataract. By R. J. MCKAY, M.D., Wilmington, Del 348

Non-pulsating Exophthalmus, with Recurring Thrombosis of Orbital Veins. By R. J. MCKAY, M.D., Wilmington, Del..... 351

Hereditary Atrophy of the Optic Nerves (with woodcut). By WILLIAM F. NORRIS, M.D., Philadelphia, Pa..... 355

The Influence of the Faradic Current in the Treatment of Vitreous Opacities, with Cases. By WILLIAM S. LITTLE, M.D., Philadelphia, Pa.... 360

Report of a Case of Glioma in a Patient Twenty-one Years of Age. By C. S. MERRILL, M.D., Albany, N. Y..... 364

A Case of Anæsthesia of the Retina, with Concentric Limitations of the Fields of Vision—Recovery through Inhalations of Nitrite of Amyl (with woodcuts). By RICHARD H. DERBY, M.D., New York..... 366

Remains of the Hyaloid Artery Attached to the Crystalline Lens—Anæsthesia of the Retina. By WILLIAM S. LITTLE, M.D., Philadelphia, Pa.. 372

Circumscribed Absorption of the Lens, Apparently of Traumatic Origin, without the Remainder of the Lens becoming Opaque (with chromolithograph). By SAMUEL THEOBALD, M.D., Baltimore, Md..... 373

PAGE

A Fragment of Glass in the Eye, probably in the Ciliary Body, for Ten Years, without Producing Serious Consequences. By SAMUEL THEOBALD, M.D., Baltimore, Md.. 375

A Case of Extensive Hemorrhage between Choroid and Sclerotic. By G. HAY, M.D., Boston, Mass. 378

A Peculiar Case of Alopecia of the Eyelids (with illustrated plate). By F. BULLER, M.D., Montreal, Can..... 381

Removal of Foreign Bodies from the Cornea. By HENRY D. NOYES, M.D., New York 384

Three Cases of Tumor of the Eye (with woodcuts). By HENRY D. NOYES, M.D., New York..... 387

Contribution to the Clinical History of Metastatic Irido-Choroiditis. By H. KNAPP, M.D., New York..... 396

A Simple Test for Simulated Monocular Blindness. By G. C. HARLAN, M.D., Philadelphia, Pa..... 400

Sarcoma of the Lachrymal Gland (with woodcuts). By G. C. HARLAN, M.D., Philadelphia, Pa..... 402

A Case in which an Attack of Acute Inflammatory Glaucoma was Immediately Followed by Inflammation of the Brain. By CHARLES J. KIPP, M.D., Newark, N. J..... 405

Embolism of the Central Artery of the Retina (with woodcuts). By W. F. MITTENDORF, M.D., New York..... 411

Ophthalmic Notes: (1.) Double Glaucoma Fulminans. (2.) Extraction of a Piece of Iron from the Lens by Means of the Permanent Magnet. By S. B. ST. JOHN, M.D., Hartford, Conn..... 421

Premature Delivery for the Prevention of Blindness. By EDWARD G. LORING, M.D., New York 423

Case of Osteoma of the Conjunctiva (with woodcut). By EDWARD G. LORING, M.D., New York..... 437

An Improved Means of Oblique Illumination—A Corneal Condenser (with woodcut). By EDWARD G. LORING, M.D., New York 439

Improved Trial Frames (with woodcut). By G. C. HARLAN, M.D., Philadelphia, Pa..... 441

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DR. CHARLES J. KIPP.....Newark, N. J.
DR. H. KNAPP.....New York, N. Y.
DR. W. S. LITTLE.....Philadelphia, Pa.
DR. EDWARD G. LORING.....New York, N. Y.
DR. F. B. LORING.....Washington, D. C.
DR. W. V. MARMION.....Washington, D. C.
DR. ARTHUR MATHEWSON.....Brooklyn, N. Y.
DR. S. F. MCFARLAND.....Oxford, Chenango Co., N. Y
DR. R. J. MCKAY.....Wilmington, Del.
DR. C. S. MERRILL.....Albany, N. Y.
DR. H. G. MILLER.....Providence, R. I.
DR. W. F. MITTENDORF.....New York, N. Y.
DR. T. G. MORTON.....Philadelphia, Pa.
DR. RUSSELL MURDOCH.....Baltimore, Md.
DR. WILLIAM F. NORRIS.....Philadelphia, Pa.
DR. HENRY D. NOYES.....New York, N. Y.
DR. J. F. NOYES.....Detroit, Mich.
DR. O. D. POMEROY.....New York, N. Y.
DR. THOMAS R. POOLEY.....New York, N. Y.
DR. J. S. PROUT.....Brooklyn, N. Y.
DR. WM. RANKIN.....Newark, N. J.
DR. CHARLES E. RIDER.....Rochester, N. Y.
DR. SAMUEL D. RISLEY.....Philadelphia, Pa.
DR. D. B. ST. JOHN ROOSA.....New York, N. Y.
DR. JOHN D. RUSHMORE.....Brooklyn, N. Y.
DR. ROBERT SATTLER.....Cincinnati, O.

DR. H. S. SCHELL.....Philadelphia, Pa.
DR. W. W. SEELY.....Cincinnati, O.
DR. HENRY L. SHAW.....Boston, Mass.
DR. FRANCIS SIMROCK.....New York, N. Y.
DR. A. G. SINCLAIR.....Memphis, Tenn.
DR. J. A. SPALDING.....Portland, Me.
DR. FRANCIS P. SPRAGUE.....Boston, Mass.
DR. GEORGE T. STEVENS.....New York, N. Y.
DR. SAMUEL B. ST. JOHN.....Hartford, Conn.
DR. GEORGE STRAWBRIDGE.....Philadelphia, Pa.
DR. SAMUEL THEOBALD.....Baltimore, Md.
DR. WILLIAM THOMSON.....Philadelphia, Pa.
DR. J. J. B. VERMYNE.....New Bedford, Mass.
DR. O. F. WADSWORTH.....Boston, Mass.
DR. DAVID WEBSTER.....New York, N. Y.
DR. ROBERT WILLARD.....Boston, Mass.
DR. CHARLES H. WILLIAMS.....Boston, Mass.
DR. E. WILLIAMS.....Cincinnati, O.
DR. HENRY W. WILLIAMS.....Boston, Mass.
DR. J. P. WORRELL.....Terre Haute, Ind.

Total.....80

HONORARY MEMBERS.

DR. G. A. BETHUNE.....Boston, Mass.
DR. R. W. HOOPER.....Boston, Mass.
DR. C. SCHWEIGGER.....Berlin, Prussia.

Total..... 3
Whole number.....83

MINUTES OF THE PROCEEDINGS.

EIGHTEENTH ANNUAL MEETING.

FORT WILLIAM HENRY HOTEL.
LAKE GEORGE, *July* 26, 1882.

THE Society held its eighteenth annual meeting at the Fort William Henry Hotel, Lake George.

The Society was called to order at 9.50 A.M., by the President DR. HENRY D. NOYES, who announced the following committees:

Committee on Membership and Nomination of Officers—DRS. JOHN GREEN, W. W. SEELY, G. HAY, A. MATHEWSON, and C. S. BULL.

Committee on Bulletin—DRS. S. THEOBALD and S. B. ST. JOHN.

Auditing Committee—DR. S. F. MCFARLAND.

The Treasurer, Dr. Richard H. Derby, of New York, read his annual report, which was referred to the auditing committee.

On behalf of the Committee on Membership, Dr. Hasket Derby recommended for membership Dr. A. Alt, of St. Louis, Mo. Upon ballot Dr. Alt was elected a member of the Society.

The auditing committee reported the Treasurer's state-

ment correct and it was accepted. The Treasurer moved that the assessment levied for 1882–1883 be five dollars. This motion was carried.

Dr. Knapp moved that each member of the Society who takes part in the discussion be requested to put his remarks as concisely as possible in writing, with a heading, and hand the same to the secretary before the close of the meeting. Carried.

The Secretary announced the death of Dr. E. Reynolds, of Boston, an honorary member of the Society.

Dr. Hasket Derby was appointed by the Chair to prepare for the "Transactions" a notice of Dr. Reynolds.

Dr. Green moved that twenty minutes be the maximum time to be allotted to the reading of any paper except by special vote of the Society in each case and by a two-thirds majority. That any paper requiring more than twenty minutes for its reading be presented in abstract under the same limitation to twenty minutes. Carried.

Dr. Green moved that this be a standing rule of the Society until rescinded. Carried.

The Committee on Bulletin reported, and the first paper was by

1. Dr. C. S. Bull: "Pulsating Vascular Tumor of Orbit, Eyelid, Temple, and Forehead, Treated by Electrolysis." It was discussed by Drs. Green, Knapp, H. Derby, and the President.

2. Dr. Seely: "Atrophied Remains of the Hyaloid System, with Attachment to the Lens and Detachment from the Papilla;" and,

3. "Serous Effusion into the Vitreous causing Total Temporary Loss of Vision due probably to Malarial Poisoning."

4. Dr. McKay: "Apparent Disappearance of Iris after Extraction of Cataract;" and,

5. "Non-Pulsating Exophthalmus, with Recurring Thrombosis of Orbital Veins."

The President suggested that the lesion described in the first paper was a case of reduplication of the iris. Dr. Seely and Dr. Buller also discussed this paper.

6. Dr. Norris (read by Dr. Harlan): "Hereditary Atrophy of the Optic Nerves and in Pigmentary Retinitis." Discussed by the President, Drs. Harlan, Kipp, Little, and McKay.

7. Dr. Little: "The Influence of the Faradic Current in the Treatment of Vitreous Opacities, with Cases." Discussed by Dr. Green and the President.

8. Dr. Merrill: "Glioma occurring in a Patient Twenty-one Years of Age."

9. Dr. Green: "A Case of Ruptured Zonula, with Remaining Accommodation." The President and Dr. Hay discussed it, and

10. "An Operation for Enucleation, with Removal of Tarsal Cartilage, and Conjunctival Sack." Discussed by the President and Dr. Knapp.

11. "Remarks on Operation for Entropion." Discussed by Drs. H. Derby, Theobald, Hay, Prout, Risley, Pomeroy, Knapp, Buller, Bartlett, and the President.

Upon motion now, it was decided to adjourn at 1.45, and meet again at 4 o'clock P.M.

12. Dr. R. H. Derby: "The Use of Nitrite of Amyl in Anæsthesia of the Retina." Discussed by Drs. Harlan, Risley, Knapp, H. Derby, Howe, and the President.

Dr. Theobald offered the following motion: "That in future meetings, no paper shall be referred to the publishing committee, unless the paper itself, or an abstract of it, shall

have been presented to the Society at its annual meeting." This motion was seconded and carried. Adjourned.

Meeting called to order, 4.20 P.M.

The President in the chair. The minutes of last session read, and after correction, accepted. The order of the bulletin was resumed.

13. Dr. S. Theobald: "Circumscribed Absorption of the Lens apparently of Traumatic Origin, without the Remainder of the Lens becoming Opaque," and

14. "A Fragment of Glass in the Eye, probably in the Ciliary Body for Ten Years without producing Serious Consequences." Dr. Green discussed this last paper.

Dr. Pooley further spoke to the paper last read by Dr. Theobald, as did Drs. Knapp and Kipp, and the President. Drs. Knapp and Kipp spoke upon the subject of Dr. Theobald's first paper.

15. Dr. Hay: "A case of Extensive Hemorrhage between the Choroid and Sclerotica." Drs. Knapp, Pooley, and the President spoke upon such cases.

The President invited Dr. Hasket Derby to take the chair.

16. Dr. Little: "Remains of a Persistent Hyaloid Artery attached to Crystalline Lens."

17. Dr. Buller described "A Case of Alopecia of the Upper Eyelids," and showed drawings and microscopical specimens of the diseased hairs. The chairman *pro tem.* suggested the possible value of pilocarpine in such a case.

18. Dr. H. D. Noyes: "Aids in the Removal of Foreign Bodies from the Cornea." Drs. Seely, Hutchinson, Kipp, McFarland, Theobald, and Buller spoke on the subject, and

19. "Penetration of a Foreign Body into the Orbit: Probable Wound of the Brain and Total Amaurosis."

Adjourned to 9 A.M. of Thursday.

July 27, 1882, 9 A.M.

Meeting called to order. Minutes of last session read and approved.

The discussion of Dr. Noyes' paper on foreign body in the orbit, taken up by Dr. McKay.

20. Dr. Noyes: "Reduction of Size and Tension of the Eyeball by Total Avulsion of Iris and by Neurectomy." Discussed by Drs. Little, Hay, Risley, Harlan, and Theobald; and

21. "Three Cases of Tumor of the Eye." Discussed by Drs. Buller and Prout.

22. Dr. Knapp: "Contributions to the Clinical History of Metastatic Choroiditis." Discussed by Drs. McKay, Hutchinson, and the President.

23. Dr. Harlan: "A Simple Test for Simulated Monocular Blindness," and

24. "Sarcoma of the Lachrymal Gland, Dislocating the Eyeball Downward, Forward, and Outward." Discussed by Drs. Theobald, Kipp, and Knapp.

Dr. H. Derby moved that the Business Committee make their report.

This was carried.

The Chairman of the Business Committee, Dr. Green, nominated the following officers for the ensuing year:

President—DR. HENRY D. NOYES, of New York.

Vice-President—DR. WILLIAM F. NORRIS, of Philadelphia.

Recording Secretary and Treasurer—DR. RICHARD H. DERBY, of New York.

Corresponding Secretary—DR. JOHN S. PROUT, of Brooklyn.

Publishing Committee—DR. E. G. LORING, DR. D. B. ST. JOHN ROOSA, of New York.

These gentlemen were all duly elected.

The Chairman of the Committee reported that in regard to a place of meeting for next year, the Committee was unable to decide between Lake George and Newport, and they preferred to leave the choice to the Society. The Secretary moved that to this list of places from which the Society should select, the Catskill House, Catskill Mountains, be added. Vote upon place of meeting was now taken and resulted as follows: For Newport, four votes; for Catskills, fifteen votes; for Lake George, two votes. It was decided then to hold the nineteenth annual meeting at the Catskills, and Drs. Harlan and Little, together with the Secretary, were appointed a Special Committee to make arrangements for holding the meeting there.

Dr. Hasket Derby moved to amend Section 3 of the By-Laws, by substituting in line two for the word "fourth," the word "third." Recess was taken and thereafter the meeting called to order. Dr. Hasket Derby's amendment was then carried. The order of the bulletin was again resumed.

25. Dr. Harlan showed improved trial frames.

26. Dr. Kipp: "A Case of Acute Inflammatory Glaucoma, followed by Cerebro-spinal Meningitis." Discussed by the President.

27. Dr. Mittendorf: "Embolism of the Central Artery of the Retina." (By title.)

28. Dr. St. John: "A Case of Double Glaucoma Fulminans," and

29. "Extraction of Chip of Iron from the Lens by means of Gruening's Magnet." Dr. Prout discussed the first paper.

By motion of the Secretary, permission was given the stenographer to furnish the Philadelphia *Medical News* with an abstract of papers read before the Society at this meeting.

In the absence of Dr. Thomson, the Secretary showed his new test-type disk.

Adjourned at 10.50 A.M.

RICHARD H. DERBY, *Secretary.*

Present at the eighteenth annual meeting:

DR. E. W. BARTLETT.
DR. C. S. BULL.
DR. H. DERBY.
DR. R. H. DERBY.
DR. J. GREEN.
DR. G. C. HARLAN.
DR. G. HAY.
DR. L. HOWE.
DR. E. HUTCHINSON.
DR. C. J. KIPP.
DR. H. KNAPP.
DR. W. S. LITTLE.
DR. S. F. MCFARLAND.
DR. A. MATHEWSON.
DR. R. J. MCKAY.
DR. C. S. MERRILL.
DR. H. D. NOYES.
DR. O. D. POMEROY.
DR. J. S. PROUT.
DR. T. R. POOLEY.
DR. S. D. RISLEY.
DR. W. W. SEELY.
DR. S. B. ST. JOHN.
DR. S. THEOBALD.
DR. J. J. B. VERMYNE.

Present by invitation:

DRS. J. A. LIPPINCOTT, Pittsburg, E. E. HOLT, Portland, Me.

RICHARD H. DERBY, M.D.,
Recording Secretary.

In Memoriam.

DR. EDWARD REYNOLDS died in Boston, December 25, 1881. As the oldest ophthalmic surgeon in the country, a founder of the Massachusetts Charitable Eye and Ear Infirmary, and one of the few honorary members of this Society, a brief sketch of his life finds an appropriate place in the Transactions.

Born in Boston in 1793, and graduating from Harvard College in the class of 1811, he studied medicine for three years at home, and for three more in London and Paris, following, among others, Abernethy, Sir Astley Cooper, and Dupuytren. While in London he was made a member of the Royal College of Surgeons. He returned to America in 1818, and soon became widely known both as a practitioner and a teacher of surgery. A successful operation for cataract, performed by him on his father, attracted many cases of ophthalmic disease among all classes; and the extensive intercourse with the poor thus brought about induced him to establish an infirmary for their relief. In company with the late Dr. John Jeffries he founded, in 1824, a gratuitous clinic for diseases of the eye and ear, and treated nearly nine hundred cases during the first sixteen months of its existence. From this small beginning has grown the present Infirmary, with its extensive buildings, large staff, and more than ten thousand yearly patients. Dr. Reynolds' connection with the institution, first as surgeon and more recently as manager, lasted till 1870; and his interest in its workings continued unabated to the end of his days.

As a teacher he was one of the founders of the Tremont Medical School, and in 1837–38, during the absence of Dr. Warren in Europe, filled, temporarily, the post of Professor of Anatomy and Surgery at Harvard University. He received honorary degrees from Bowdoin College and Brown University, and in 1864 was made an honorary member of the American Ophthalmological Society, at its second annual meeting. Of late years he had retired from active practice.

For many years Dr. Reynolds was the leading ophthalmic surgeon in New England, and enjoyed an exceedingly large practice. Due, as this justly was, to his professional skill, it was largely aided by his never-failing geniality, entire absence of professional jealousy, and to a kindness as constant as it was unselfish.

PULSATING VASCULAR TUMOR OF ORBIT, EYELID, TEMPLE, AND FOREHEAD, TREATED BY ELECTROLYSIS.

By CHARLES STEDMAN BULL, M.D.,
NEW YORK.

THOUGH the application of elctrolysis in the treatment of vascular growths is by no means a new thing in surgery, and although it has had a somewhat extended trial in small vascular growths or nævi in the eyelids, its application in the treatment of *large* vascular tumors of the orbit or eyelids, or in fact in any part of the body, has been limited. The following case is therefore reported, not only on account of its rarity and the great size of the tumor, but also as demonstrating the advantages and disadvantages of employing electrolysis in the treatment of large vascular growths in the vicinity of the orbit and eyelids.

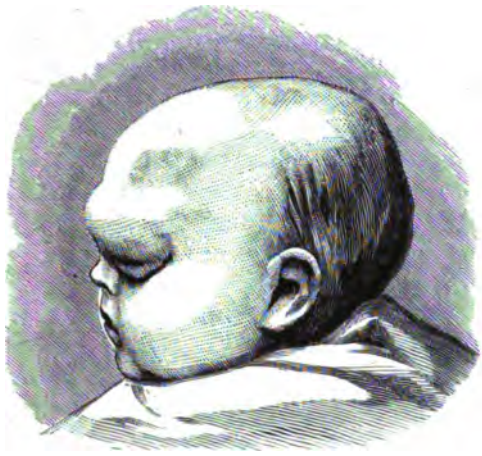
The patient was a female child, M. E. S., who was admitted to the Nursery and Child's Hospital on September 19, 1881, at which date she was twelve weeks old, and I first saw the child one week later. The following information was obtained from the mother: The family history was excellent on both sides. The father and mother are both living and apparently in robust health. The little patient was their first child, and was born at full term, after a very easy, normal labor, on June 26, 1881, and has been nursed by the mother from her birth. She has never had a day's illness, and sleeps quietly and soundly at night. On the second or third day, the mother does not exactly remember which, she noticed a spot, about the size of a small nickel cent, half an inch above the centre of the left eyebrow, upon the forehead, and on the right of this, and near the median line, another of the same character but smaller in size. These two spots were but very slightly or not at all elevated above the surrounding surface, were very *white* as compared with the surrounding skin, but there was no swelling or roughness of the skin noticeable. The child grew rapidly, but the spots remained unchanged for a period of three weeks, and nothing abnormal was noticed

for the same period, when there appeared a slight discharge from the left eye, as if the child "had caught cold in the eye," which was probably muco-purulent in character, as the eyelids were glued together at times. Though this was treated with astringent applications by a physician of the neighborhood, the eye did not improve and the discharge continued. About the same period, or three weeks after birth, a small vivid red spot, as large as a pea, appeared upon the lower anterior surface of the right forearm and has slowly increased in size. The upper eyelid now began to have a swollen appearance, and partially concealed the eyeball, and about this time the two spots began to grow red, not suddenly, but very gradually, and this was accompanied by an extension of the swelling from the eyelid upward and forward. During the next five weeks there was an occasional cloudy, watery discharge from the eyelids, and the swelling of the upper lid and supraciliary region became more prominent.

The area of redness spread somewhat rapidly over the whole eyelid, upward upon the forehead, and slightly upon the temple at the external commissure of the lids. During the three weeks preceding the child's entrance into the hospital, the tumor increased in size very rapidly upward, outward, and inward toward the nose, as well as forward, giving a marked prominence to the growth in the supra-orbital region, and to some extent filling the zygomatic and temporal fossæ. The mother also noticed that the child could not lift the upper lid, that the eye was pushed very decidedly forward, and was very limited in its motions. The area of redness was always progressive, but not to the same degree in all directions, the main extension having been upward upon the forehead, "in two tongues," as the mother expressed it. It also gradually changed from a light red or pinkish hue to a reddish-purple color.

When I first saw the child she was a very marked example of perfect health in every particular, except the left eye and vicinity. A careful examination revealed the following condition of affairs: The swollen and purple eyelids projected almost directly forward in front of the plane of the orbit in a mass as large as the two closed fists of the child, so that, in a profile view of the face, it concealed the entire nose, except the tip. The lower lid was entirely hidden from view by the overhanging upper lid, which was pushed downward much below the level of the lower orbital margin, and about on a plane with the junction of the nasal cartilages with the naso-buccal furrow. The swelling extended over the entire upper lid, upon the bridge of the nose, and encroached upon the right side of

the nose and nasal end of the right eyebrow. The child's forehead was rather prominent, and the swelling extended well above the frontal bosses. The growth also filled the entire zygomatic fossa



and nearly the entire temporal fossa, extending backward to the anterior edge of the concha. Most of this swollen region in the lid and on the forehead was of a livid red or purple, but the inner or nasal end of the lid was much lighter in color, and the temporal

region was scarcely discolored. From the supraciliary region there extended upward two irregularly shaped tongues well toward the line of the hairy scalp, which were much brighter in color, and

resembled strongly in appearance the ordinary vascular nævus. The ciliary margin of the lid, while almost purple in color, was but little swollen, and there exuded from beneath it a thin muco-purulent discharge. The skin over the swollen region was tense, except at one point, the most prominent of all, which was situated over the line of the superior orbital margin, and at the union of the middle and inner thirds of the lid. Here the skin fluctuated on pressure, and was evidently very thin. Careful examination showed that the main swelling was in the subcutaneous tissue of the lid and eyebrow, and in the orbital tissue, while the skin itself was the seat of a pure nævus. The growth in the zygomatic and temporal fossæ, though yielding slightly to pressure, was firm and dense, but the swelling in the lids and orbit yielded markedly to pressure, and a few moments' compression with the fingers directly backward toward the apex of the orbit sufficed to diminish the size of the tumor by from one-half to two-thirds. The moment, however, that the fingers were removed the swelling reappeared as before.

On lifting the upper lid, the eyeball was seen to be pushed downward and inward, toward the nose, but there was little protrusion of the eye beyond the normal plane of the orbital opening, showing that the orbital part of the growth did not extend deeply into the orbit, but rather occupied its upper and outer portions, and this latter fact could be recognized by introducing the finger beneath the upper lid at the external canthus. The eye was limited in motion in all directions, but especially upward and outward. The media and membranes were perfectly normal, the iris reacted naturally, and an ophthalmoscopic examination showed a normal optic nerve and retina with no change or interference in the papillary circulation. Close observation of the apex of the growth discovered a slight pulsation visible to the eye, and this became more distinct to the fingers when a slight pressure was made upon the tumor. The thinning of the skin over the apex of the tumor, and its easy indentation at this point, convinced the writer that there was a cavity of some size in this region, which probably was entirely outside of the orbital cavity, and was filled with blood; and that, therefore, the tumor was of a mixed nature, cavernous as well as telangiectatic, in this resembling so many vascular tumors, not only of the lids but of other parts of the body. A vessel as large as a large goose-quill could be felt under the skin at the external angle of the lids, and could be traced a short distance toward the temple, and another one, somewhat less in size, was felt running across the bridge of the nose and

connecting with the angular artery on the right side; this was distinctly an artery, as it pulsated under the finger. Pressure upon one or both of these vessels made no difference in the swelling. Pressure upon one or both carotids produced no effect on the size of the tumor even when kept up for some time, but it stopped all pulsation. At no time was there any murmur or bruit noticeable over the tumor or vicinity. The child was very restless during this long examination, and cried persistently, but became quiet immediately when left undisturbed. Some bleeding from beneath the eyelids followed, but it was slight in character and ceased in half an hour. Another point determined by the examination was that the pressure of the tumor had produced an absorption of the underlying bone in at least two places, for just over the supra-orbital margin, in a line with the point of exit of the supra-orbital nerve, was a distinct excavation in the bone into which the point of the finger could be introduced, and at the external angle of the orbital margin was another and larger excavation. The skin over that portion of the tumor occupied by the two tongues before mentioned was corrugated both to the sight and touch, and all over the growth, in detached spots, there was a well-marked superficial arborescent vascularity. The nævus upon the forearm was about the size of a silver ten-cent piece, with elevated surface and sharply defined outline. There were no other marks anywhere else upon the child's body.

A consultation was held by all the members of the attending and consulting staff, all the gentlemen but one agreeing in their opinions as to the nature of the tumor, but differing somewhat in their opinion as to what ought to be done. One of the gentlemen, however, differed from the opinion of his colleagues that it was a mixed telangiectatic and cavernous growth, and thought that it might be malignant in character.

The methods proposed for the relief of the child were, with one exception, of the same nature and differed only in detail. The first thing to do was to cut off the blood-supply in one of several ways. The majority were in favor of ligating the left common carotid in the usual way. Another suggestion was to tie both the external and internal carotid arteries on the left side. Still another was to ligate both common carotid arteries, because the tumor extended somewhat beyond the median line and evidently drew some of its vascular supply from the vessels on the right side of the face, and also because of the possible internal anastomoses within the orbital cavity through the medium of the ethmoidal vessels. This proposition was aban-

doned, because it left the supply of blood to the head to be carried on only through the medium of the vertebral arteries, and in an infant these vessels are very small and probably of insufficient size for the nourishment of the parts. It was thought that the left common carotid artery at least should be tied, as a preliminary step, and that afterward, in case there was but little diminution in the size of the tumor, an operation might be undertaken for ligating any smaller vessels round the base or outskirts of the tumor. It was the opinion of most of the gentlemen who saw the case that electrolysis was not to be thought of as a primary or preliminary operation, owing to the extreme size of the tumor and also to the probability that it was a mixed cavernous and telangiectatic growth; but that after the carotid artery had been tied and the child recovered from the operation, electrolysis might be essayed as a further help in bringing about coagulation and diminishing the size of the tumor. From all these opinions the writer ventured to dissent. He was of the opinion that the child was too young to allow of any hopes of a successful result from ligation of the common carotid artery, as death would probably ensue. The operation of ligating the nutrient vessels at the base or periphery of the tumor he thought too dangerous to be justifiable without previously tying the common carotid. He was strongly inclined to try electrolysis as a primary operation as the least dangerous in the case, while it might produce at least a partial result in lessening the size of the tumor. It was finally decided to keep the child under observation in the hospital and await further developments, and to give five-drop doses of the fluid extract of ergot three times a day, as a possible means of controlling the circulation.

The child was under observation until the end of December, and during the first month of this period the tumor slowly increased in size and the skin over the palpebral portion seemed to grow thinner, but about the fifth week after the administration of the ergot had been begun, the growth seemed to stop and the tumor remained apparently stationary in size for several weeks. Then it began to slowly diminish in prominence, and this continued until the end of December, when the mother was permitted to go home with the child, upon condition that she was to return immediately if any change for the worse appeared.

During all this time the ergot had been constantly administered, and the mother was directed to continue its use at home. The child was not seen again until the middle of March, 1882, at which

time the tumor had increased very much in size, and the anterior skin wall was extremely thin. The mother had neglected the ergot treatment, and there had been recently several small hemorrhages, which apparently came from beneath the surface of the lids, and frightened the mother very much. There was no change whatever in the child's general condition, and, after a week's observation, it was not deemed advisable to postpone operative interference any longer. As at the first consultation, so now, the writer determined on electrolysis, as perfectly applicable to a soft growth which contained a decomposable liquid, whether arterial or venous, or both. It was thought that the decomposition of the blood and the accumulation of the acids and alkalies at each of the poles would bring about a chemical cauterization in the walls of the blood-vessels. This would probably aid the physical cauterization produced by the heat developed by the galvanic current passing through the needles, and thus assist in the disintegration and absorption of the tumor. There would be little or no danger of hemorrhage, as the coagulation would be instantaneous around the needle punctures, and the only danger to be feared would be a possible suppuration and abscess in the tumor, ending in perforation of its anterior wall. We know that this electrolytic action is most pronounced at the cathode, and that absorption is hastened by the chemical effects of the current and the mechanical and irritating effects of the needles, and that this may slowly continue for weeks. As a result, disintegration and atrophy take place, which continue for a long time after all electrolytic treatment has ceased. Another fact which inclined the writer strongly to electrolysis lay in the knowledge that we have that an erectile tumor offers but little resistance to the passage of the galvanic current, and its tissue readily electrolyzes. Furthermore, in vascular tumors, both poles of a galvanic battery may be made to operate simultaneously.

The first application of the electrolytic method was made on March 28, 1882, the child having previously been etherized. The battery first employed was a zinc-carbon Stöhrer battery; and on the principle that definite electro-chemical action may be excited when either one or both electrodes are broad flat disks, the first operation was done with a needle at the negative pole, and a flat sponge disk at the positive pole. The needle was plunged through the skin into the tumor at the external angle of the orbit, and the sponge or positive pole was at first placed over the swelling in the temporal fossa. The current from two cells was then turned on,

and after one minute increased to four cells, and after another minute to eight cells. At the end of the third minute the positive pole was removed from the temporal fossa, and placed over the superior orbital margin, just covering the thinnest part of the tumor-wall. The number of cells was then gradually increased to sixteen, and after six minutes had elapsed from the time the current was first allowed to pass through, it was broken. A small nodule of condensation was felt around the negative pole, and the needle was withdrawn with some difficulty. Time, six minutes; current from sixteen cells. The child rapidly regained consciousness, and in less than ten minutes was laughing and crowing in its mother's arms. There was no perceptible change produced in the tumor by the operation, and no general rise of temperature, or any untoward symptom, in the general condition of the little patient.

On April 1st, the third day after, the second session was held. The child was etherized as before, and the needle, or negative pole, inserted about half an inch from the previous point of insertion, and just over the superior orbital margin. The positive pole, or moist sponge disk, was applied to the nasal end of the tumor, and a current from two cells was then passed. The number of cells was slowly increased to sixteen, and the positive pole was slowly moved about all over the inner or nasal half of the tumor. This second session lasted twelve minutes before the current was broken. As before, a quite marked nodule of condensation was felt at the negative pole, and the needle was removed with some little difficulty, and was followed by two or three drops of almost black blood. The child regained consciousness rapidly, and its general condition was apparently entirely unaffected, either by the etherization or the operation, there being no rise of temperature or acceleration of the pulse. Current from sixteen cells; time, twelve minutes.

The *third* session was held on April 7th, six days later, and a different battery was made use of, being a modification of the ordinary zinc-carbon battery by Spamer. The battery-fluid employed was composed of potass. bichrom., 20 grammes; acid. sulphuric., 45 grammes; hydrarg. sulph., 2 grammes; and aq. destill., 300 grammes. As electrolysis is produced most quickly and effectually when the current is made very dense by the use of small needles, it was determined to use small needles at both poles. The negative pole was introduced into the tumor on the nasal side, just at one side of the bridge of the nose and below the inner end of the

eyebrow, and the positive pole was introduced on the temporal side near the external angle of the orbit and just above it. As at the other sessions, the operation began with a current from two cells, and this was gradually increased to eighteen cells. The distance between the points of the needles was about half an inch, as nearly as could be determined. Marked condensation occurred at the negative pole and a somewhat slighter hardening at the positive pole, but there was no perceptible diminution in the size of the tumor. Both needles were withdrawn with some difficulty, and their removal was followed by some slight bleeding. The superficial color of the tumor became decidedly paler, and this was also noticeable in the two tongue-shaped nævi which ran up on the forehead, and lasted for a short time after the breaking of the current. Current from eighteen cells; time, twelve minutes.

The fourth session was held on April 11th, four days later. The negative pole was introduced just below and to the inside of the external canthus, and two needles were attached to the positive pole, one being introduced on the nasal side, very near the point of entrance of the positive pole at the previous session, and the second being introduced through the lid lower down. A current from two cells was then passed, and this was somewhat rapidly increased in strength, until twenty-two cells had been connected. The two positive poles evidently entered a cavity, as they moved freely about and could be made to rub against each other. The tumor blanched rather rapidly under this current, which was kept up unbroken for fifteen minutes. When the current was broken the needles at the positive pole were removed without any difficulty, but the negative pole was removed with great difficulty, came out with a jerk, and was followed by some fluid blood and a good deal of thick disintegrated blood. Violent reaction followed, with marked increase in size of the tumor, a rise of temperature to 102¼, and pulse of 168, with vomiting, crying, and constant restlessness, coming on in about five hours. There was marked and extensive condensation about all three needle-holes, and a perceptible diminution in the size of the tumor. The unpleasant symptoms disappeared on the following day, but the condensation remained and had increased, so that over a space included between the points of entrance of the needles the tumor was hard and firm, and pulsation had ceased. The area of condensation was about an inch and a quarter in diameter, and was of an elliptical shape. Owing to one of the needles having partially lost its insulating envelope, there was a small slough of the skin at

its point of entrance, but this proved to be very superficial and there was no hemorrhage at this point. The hardening and condensation increased slowly as long as the child remained under observation, but unfortunately the father removed her from the hospital on the fifth day after the operation, contrary to the expressed wishes and direct orders of the writer.

In conclusion I have to thank Dr. Charles T. Poore and Dr. Beverley Livingston for the use of their batteries and their kind assistance at the operations, as well as Drs. Henry and Murray, of the House Staff of the Nursery and Child's Hospital.

REMARKS.

DR. JOHN GREEN, of St. Louis, was of opinion that absolutely nothing was gained by employing an apparatus of this particular kind.

DR. H. KNAPP had seen a case of a similar nature, in which the angioma began soon after birth as a small red nodule at the outer part of the upper lid. In the course of eighteen months it had increased in every direction and occupied, when seen by the doctor, almost the whole corresponding side of the head, face, and neck. The case was considered incurable.

DR. H. DERBY, of Boston, asked Dr. Bull what size needles were employed. Dr. Bull replied, the smallest.

ATROPHIED REMAINS OF THE HYALOID SYSTEM ATTACHED TO THE POSTERIOR POLE OF THE LENS AND DETACHED FROM THE PAPILLA.

BY W. W. SEELY, M.D.,

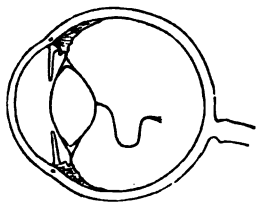
CINCINNATI, O.

J. V. V., of Kentucky, thirty years of age, says he noticed dimness of vision in his left eye eighteen years ago. I examined the eye when he was a student of the Medical College of Ohio, November 23, 1880.

V. = $\frac{20}{cc}$, and, with +1.5 Dc. axis 90° or −1.5 Dc. horiz., V. = $\frac{20}{LXX}$.

The ophthalmoscopic examination revealed a dark thread with

vermicular movements on the slightest change of position of the eyeball. The woodcut (the drawing was made by my assistant, Dr. D. De Beck) shows the position it invariably assumed when at rest. Now and then the movable end apparently shot backward, reaching quite to the papilla. As will be seen by the cut, the attachment was at the posterior pole of the lens. So far as I have been able to find in the published records of the atrophied remains of the hyaloid system, this is the only case in which the detachment has occurred at the papilla.



SEROUS EFFUSION INTO THE VITREOUS.

BY W. W. SEELY, M.D.,
CINCINNATI, O.

SEROUS EFFUSION INTO THE VITREOUS HUMOR, CAUSING TOTAL TEMPORARY LOSS OF VISION, DUE PROBABLY TO MALARIAL POISONING—RECOVERY.

FROM reports by various observers [1] it seems pretty clear that no part of the eye has immunity from the poisons of malaria and miasma, but I am not aware that any record has been made of the total abolishment of vision from *serous effusion* into the vitreous as the result of malarial poisoning.

The patient was a man thirty-three years of age, who appeared and claimed to be, and to have been free from disease or injury of all sorts, and in whom no indications of such could be discovered by repeated examinations and questionings.

The history of the ocular trouble, in brief, as given me was as follows: About September 15, 1879, he noticed rather suddenly dimness of vision and floating bodies (I will refer to these further on), and was just able to read. By September 25th, *i.e.*, in ten days, the vision had grown so much worse that he came to Cincinnati to consult an oculist, by whom, as I afterward learned, he was told

[1] I would make special mention of Dr. Kipp's paper before the Medical Society of New Jersey, On Eye Affections from Malarial Poisoning.

that the eye was full of blood. He underwent a course of sweating for a week with jaborandi, which was followed up by pills, pilocarpine (?) possibly. The vision remained about the same for six weeks, when it grew still worse, and leeches were applied and various remedies prescribed, though he did not know what they were. At this visit to the city he remained about three weeks in a dark room and continued to grow worse. In about six weeks the vision had cleared up somewhat, when he was given phosphorus, and the vision cleared up still further.

About the middle of February, 1880, vision was totally lost in about two hours. He returned again for treatment, and leeches were applied, the patient remaining in bed in a dark room for six weeks.

May 1, 1880, he was led to my house. I found a long-standing external squint of one eye with extreme amblyopia, and no perception of light in the other formerly good eye, except the faintest by the most peripheric upper and inner portion of the retina, after mydriasis. Pupillary reaction limited and tension normal.

With the ophthalmoscope and undilated pupil everything was a blank. On dilating the pupil with duboisia, and looking upward and inward in the extreme, I could get a trace of red reflex.

I was immediately impressed with the fact that I had never seen such a case before. The patient seemed very much surprised at my perplexity, and asked if there was anything more than the "blood."

As yet I had learned nothing of his history, and of course was entirely ignorant of what diagnosis had been made. I simply knew he had been treated.

At the close of my examination I gave the opinion that the vitreous was filled with effused *serum*, and that, so far as I knew, there could only be one explanation—malaria—though no history of any other manifestation had been elicited. Subsequent examinations only confirmed me in the view taken.

The patient went home July 20, 1880, with vision $\frac{20}{xx}$. No trace of any fundal disease could be discovered, though I examined the eye almost every day for two months, *i. e.*, till vision had become normal; nor was there at any time visible floating bodies; and while the patient claimed he saw such in the beginning of his trouble, he finally said it was rather a "waving" before the eye.

The vitreous began to clear up in a day or two after the first visit of the patient, and the vision grew so rapidly and uninterruptedly

better, that I resorted to no treatment other than duboisia dilatation for my examinations.

In September, 1880, the patient wrote me that, after a long drive in the rain, his vision had deteriorated somewhat, "had become smoky," but he did not come to the city, although the vision continued poor, till October, when he remained four or five weeks, during which the vision rapidly returned to $\frac{20}{xxx}$, with some floating bodies, perceived with difficulty by the ophthalmoscope.

During this visit I was sent for, the messenger saying my patient was very sick. It proved to be a severe chill.

I now gave him some pretty large doses of quinine for a few days. A letter received from the patient, April 17, 1882, says: "I am about the same as when I last saw you," *i. e.*, visually. He complained somewhat of what he called a lame feeling in the region of the kidneys, the same as he had done often before, and I wrote him to take quinine for a time. A very large number of examinations were made of the urine, but nothing abnormal found.

We, of course, know that malaria produces a similar state of things in the kidneys, even a hæmaturia, and I am confident I have seen at least one case of effusion into the middle ear due to malaria, though the patient, as I diagnosticated, was suffering from malarial albuminuria, and hence not to be absolutely set down as the primary result.

Is it not probable that in the case narrated, as in the kidney and bowels, the poison selecting the blood-vessels, prepared the way for the escape of the watery part of the blood—an effusion?

That a more profound effect can be produced upon the choroidal or retinal vessels by malaria, giving rise to hemorrhage into the vitreous, I am prepared to believe from my own observation, though the two cases in support are lacking in such completeness of examination as to justify a detailed report. However, what my cases lack in completeness is quite supplied by the one reported by Dr. Kries, in Vol. XXIV., Part I., page 159, of "Graefe's Archives."

I will add, in conclusion, that a differential diagnosis, at least to my eye, between what was in this eye and a hemorrhage, was not at all difficult.

This impenetrable cloud of mist made, to my eye, a striking contrast with the solid blackness in some cases, the red appearance in others, of a hemorrhage.

In reply to a question by the president, Dr. Seely said the vitreous was opaque, that there was no evidence of syphilis.

APPARENT DISAPPEARANCE OF IRIS AFTER EXTRACTION OF CATARACT.

By R. J. McKAY, M.D.,
WILMINGTON, DEL.

JAMES W., aged fifty-seven, mechanic and farmer, had in his early manhood been more or less addicted to drink, and was very excitable under its influence, but for many years had not stimulated at all. He called upon me June 10, 1879, to have his eyes examined. The sight of the right eye began to fail three years previously, and was now blind from mature cataract, and the left eye failing from incipient cataract. Its V= fingers $3\frac{1}{2}'$.

September 16th following, Graefe's method of extraction was performed upward, under anæsthesia by Squibb's ether and chloric-ether, to which he succumbed after taking them about three-quarters of an hour, and making so much resistance as to cause great congestion of face and head. Excision of iris was followed by immediate filling of anterior chamber with blood, which was partially removed several times, leaving very little in it. During the evening, five to six hours after the operation, he manifested maniacal excitement for several hours and was very restless, requiring four persons to keep him in bed. Examination of eye forty-eight hours afterward showed a blood-clot in anterior chamber, obscuring almost the entire iris. Moderate iritis and capsulitis ensued, which was treated by atropia and warm water bathing. Six weeks after the operation he could read Snellen type No. 6 in about 6″ with $+2\frac{1}{2}^{s}$ lens, through a linear aperture between the layers of unabsorbed blood-clot. The atropia was continued and slight dilatation of pupil was obtained. About two months after the operation, while visiting him at intervals of several days, I was surprised to fail to discover the usual color of the iris, and was perplexed for a time as to its absence, not knowing whether permanent dilatation of the pupil, or complete atrophy of iris had occurred. Eserine was used in solution, but only caused spasmodic contraction of ciliary muscle, and nothing of the color of iris was ever to be seen afterward. The aqueous remained clear and anterior chamber fully established. Ex-

amination manifested a complete opacity of entire capsule apparently, with irregular linear deposits of blood-pigment upon it, *corresponding to original site of blood*, and not like iritic pigmentary deposit.

Ophthalmoscopic examination gave a uniform red reflex all over capsule, but too indistinct to see details of fundus clearly. The second American edition of Soelberg Wells, page 165, says: "It has been urged by some that the long-continued use of a strong solution of atropine is apt to produce permanent dilatations of pupil from paralysis of the sphincter pupillæ," and adds: "But this is a most rare and exceptional occurrence, and may be easily overcome by use of calabar bean." The American edition of Stellwag of 1868, page 187, mentions briefly complete atrophy of iris, and says "that the iris has more the appearance of a gauze-like, extremely delicate transparent membrane." Knapp's "Reports and Remarks on a Third Series of One Hundred Cases of Cataract Extraction by the Peripheric-Linear Method," in "Archives of Ophthalmology and Otology," Vol. I., pages 103–139, and also a similar "Report and Remarks on a Fourth and Fifth Hundred of Cataract Extractions According to Von Graefe's Method," in Volume VI. of same "Archives," pages 7–134, although very full, interesting, and instructive, does not describe anything at all analogous in its results to my case.

February 24, 1880, a secondary operation was done upon capsule, and later a $+4^s$ blue-glass lens was ordered for bright days. He began to recognize persons and objects well, when a dense opacity of vitreous occurred, dependent upon great excitement due to family troubles, and continued to August, 1880, when he moved to Ohio, and passed from under observation.

In Alt's "Lectures on the Human Eye in its Normal and Pathological Conditions," of 1880, page 92, under "Atrophy of Iris," he says: "In one case of very far advanced atrophy of the iris I found the anterior endothelium in a state of colloid metamorphosis. With a low magnifying power it appeared like a new-formed transparent lamella, covering the anterior surface of the iris. With a high power it was easily seen to consist of endothelial cells, filled with colloid substance." And he ends the article with, "Atrophy of the whole iris, of course, involves also its blood-vessels and nerves."

REMARKS.

THE PRESIDENT asked whether there was any loss of the vitreous during the operation? To which question Dr. McKay replied: "A

very slight amount." The President remarked that the Society would probably accept the Chair's explanation of the case to be the correct one, to the effect that it was a reduplication of the iris, a folding back of the ciliary processes.

DR. SEELY said he had regarded reduplication of iris backward, as stated by Dr. Noyes, as the explanation of such disappearance of the iris, one of two examples of which he had seen after cataract extraction with resultant hemorrhage.

DR. F. BULLER saw a case of disappearance of the iris after removal of cataract in a young man about eighteen years of age. The cataract had been needled two or three times in the course of a few weeks, and then almost completely extracted by the use of a curette. A moderate degree of reaction followed this, and the pupil was kept pretty largely dilated with atropia. About a week or ten days after the extraction he was surprised on making the morning visit to find that the iris had entirely disappeared, although up to this time the eye had presented nothing unusual in its appearance. The patient denied having in any way injured the eye during the night.

There was no intra-ocular hemorrhage, but a considerable cloudiness of the vitreous, so that the optic nerve could only be dimly seen. This cloudiness increased to such an extent that a few days later nothing could be seen of the fundus. Eserine or calabar extract was used freely without benefit, and the patient left the hospital shortly afterward unrelieved.

He regarded the case as one of complete retroversion of the iris, which, however, was certainly not at all atrophied when it occurred.

DR. McKAY said the patient had seen an oculist of Cincinnati, he believed Dr. Wilson, who, according to the patient's statement, was of opinion that atrophy of the iris had not ensued in this case.

NON-PULSATING EXOPHTHALMUS, WITH RECURRING THROMBOSIS OF ORBITAL VEINS.

By R. J. McKAY, M.D.,
WILMINGTON, DEL.

At the suggestion of Dr. L. P. Bush, her family physician, Mrs. McC., aged twenty-eight and one-half years, native and resident of Wilmington, Del., called to see me professionally February 17, 1881, about the protrusion of her right eye. She said it was first observed when she was ten years old, and had always been more noticeable when she was angry.

She began to menstruate at thirteen years of age and the protrusion was always more manifest at those periods, beginning a few days before the flow and continuing a day or two after it ceased, thus experiencing monthly eight or nine days of more or less enlargement.

No history of injury or accident could be obtained to cause or complicate the protrusion.

For a number of years it increased in size very slowly and gradually. She was married when between twenty-one and twenty-two years of age. It did not enlarge during pregnancy, but did very much during each labor.

She has had three children, aged respectively six and three years, and a baby six months old, which she was then nursing. All of her labors were severely straining and tedious.

During her first visit to me she presented such an unsightly appearance that she said she covered her face well when out-doors to prevent people staring at her.

The right orbital and temporal regions were greatly enlarged and congested. The right upper eyelid was of a dark red hue and tense from being stretched to apparently double its usual size in every way to cover the right eye, which protruded fully three-fourths of an inch farther than its fellow, and she could not entirely close her right eyelids. Several nodules of distended vein were seen at upper inner angle of orbit (which first appeared just after her second child was born), and more were felt there as well as above and behind the eye, extending back into the orbit.

The conjunctival surface of lower lid was engorged, thickened and inflamed. The movements of right eye were all diminished, but more especially upward and inward. The cornea and media of both eyes were clear and refraction hypermetropic. The optic disk of right eye had a grayish line, and its V.=$\frac{1}{xx}$ in dim light. The optic disk of left eye normal, and its V.=$\frac{1}{xx}$ in dim light. Inspection of cheek, nose, and mouth revealed nothing abnormal. She had never heard any noise about the eye or head. No bruit was discovered by stethoscopic examination of eye or head. Pressure upon eye could not reduce it perceptibly. Pressure upon right carotid artery could not be borne longer than four minutes even in a recumbent position, because of pain and dizziness, and it caused no change in the appearance of the parts.

Prescribed for the conjunctivitis and told her the protrusion was due to enlarged orbital veins behind the eye and advised non-interference at that time. She then told me Dr. Agnew, of Philadelphia, had given her the same opinion and advice three years previously.

April 9, 1881, was called to see her, and found the right lower lid everted, which was readily reduced. Four days later learned it had been several times everted and reduced by Dr. Bush (who was attending her sick baby), and he had applied adhesive plaster strips to prevent eversion, which produced pressure upon upper eyelid and eyeball, causing pain and discomfort. Removed it and applied a flannel pressure bandage, gently raising the cheek and lower lid, but it could not be borne, because the eversion, œdema, and swelling of both lower ocular and palpebral conjunctiva increased notwithstanding free scarifications.

On April 15th, three days later, she complained of losing sight of right eye, and ophthalmoscopic examination showed optic neuritis. The protrusion and swelling of orbital veins were increasing.

April 20th.—Scarifications of everted lower lid. 21st.—Less swelling, and marginal corneal ulcer first observed at its lower edge. The only movements of eyeball now were very slightly from side to side. 28th.—Within last two or three days there has been less swelling of orbital contents and less distention of upper lid, and the venous plexus at upper inner orbital angle was less movable and less compressible by digital examination. A sero-purulent discharge was observed, and the whole cornea was covered by a yellowish, opaque, tough scab, which was partially removed and paracentesis was done with a straight, lance-shaped iridectomy knife. No discharge followed, and the eye became so painful for several days that anodynes

were necessary to quiet her sufferings. Her appetite became very poor and she became very weak and pale.

Early in May thrombi formed in the visible and palpable orbital veins, and they subsequently became very small. The cornea sloughed entirely off. Plastic irido-choroiditis ensued and frequent punctures of iris lessened size of globe, but not very materially. Incisions to overcome occlusion of pupillary margin of iris were unavailing to procure discharge of vitreous contents of eyeball, although frequent tents and plugs of lint and cotton were introduced and left in the incisions and continual poulticing of eye was kept up nearly two months.

Early in June the nursing of the baby was stopped. She became comfortable and regained strength somewhat during the first three weeks of June. On the 21st the eye began to swell and pain, and the 23d I enucleated it under ether, with the assistance of Drs. L. P. Bush and I. W. Hazlett, of Wilmington (Dr. James R. Taylor, of New York City, being present).

After its removal the orbit seemed filled with a mass of veins, which felt like a varicocele very thinly covered. A flannel pressure-bandage, applied moderately tight, had to be removed next morning because of great pain in orbit and right side of head. Her menses came on during the night after the enucleation and continued five or six days. The swelling and enlargement of contents of orbit and the everted, dependent lower lid greatly increased. Fever ensued, with irregular chilly sensations, and she manifested slight delirium during several nights. Grave apprehensions of purulent infection were felt, thrombi again formed, and the dangerous symptoms gradually subsided, although for several weeks thereafter her stomach was so irritable and intolerant of all kinds of food that inanition was seriously threatening. To Dr. Bush I am under grateful and lasting obligations for advice and daily assistance at this critical period.

In latter part of July, when her menses again appeared, the right orbital contents, eyelids, and temporal region again became engorged, painful and enlarged, but all in a much less degree than in June, and no grave symptoms accompanied them, although a third manifestation of thrombosis ensued. From that time at each successive menstrual period, the enlargement of orbital region and surroundings seemed less and less marked, and before the end of the year the right upper lid looked nearly as small and natural as that of the other eye, and the orbital contents were shrunken somewhat

below the level of the edges of orbital margin. The lower lid was still everted and its conjunctival surface congested, thickened, and dependent. She called upon me April 4, 1882, to have something done to remove the unsightly condition of lower lid, which remained everted, dependent, and swollen, but less congested and not at all tender to the touch, as formerly. She reported that during the last few menstrual epochs a shrinking of parts about the right orbit seemed to take place and she experienced no discomfort.

The floor of orbit looked pale and sunken. The upper lid was sunken as usual after enucleation, with the exception of a small mass of the enlarged vein, which can be seen and felt at upper, inner angle of orbit. It is slightly firm but not at all tender.

The everted lid was readily replaced in orbit and kept up by strips of adhesive plaster applied vertically, extending from slightly below lower orbital margin upon supra-orbital region. Two days later it was reduced considerably in size and manifested very little tendency to roll out and downward. Further reduction was procured by applications of pure stick of nitrate of silver, which have been repeated from time to time since. Now, very slight ectropion occasionally manifests itself, and she wears smoked glass with gold wire goggle protection and screen, and a + 60 glass to correct the hypermetropia of left eye.

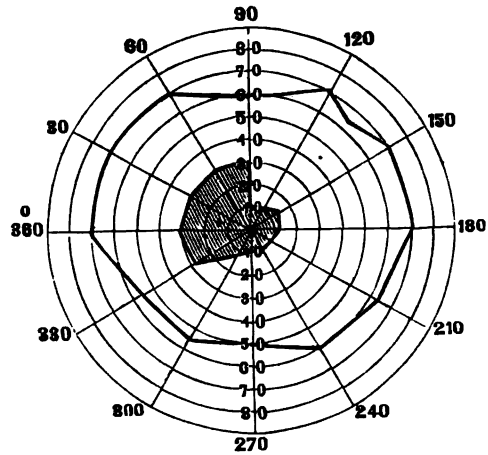
HEREDITARY ATROPHY OF THE OPTIC NERVES.

BY WM. F. NORRIS, M.D.,
PHILADELPHIA, PA.

CASE I.—A. H. A., aged forty-nine, is a well-developed, vigorous-looking man, never addicted to the use of either alcohol or tobacco; complains that for about a year he has been losing sight, and is now so blind that he has some difficulty in getting about by himself. He was conductor on one of our steam railways, but found a cloud settling over his sight, which in a few weeks became so dense that he could not see signals nor read ordinary print, and was consequently compelled to abandon his avocation. At present, his eyes appear normal externally. The pupils are of medium size, and respond promptly to changes of light and shadow. Central vision is, however, almost completely abolished in both eyes, and he can only count fingers when they are about six inches to either side of the visual axis. He can, in a dark room, however, see a gaslight five feet distant, when looking directly at it, when it is turned down to the size of a candle-flame, but not when the illumination is farther diminished. The patient complains much of any bright light, and when out in the sunlight, always wears smoked glasses. The ophthalmoscope shows that the disk of the right eye is slightly ovoid vertically, with a choroid ring all around, passing into an irregular black-peppered *conus* to the outside, which is one and one-half times the width of the main central veins. There is a slight central excavation, but the rest of the disk is of a greenish-gray hue, a trifle prominent. It is entirely devoid of capillarity, but the central vessels have about their usual calibre. The choroid is perhaps more granular than usual; but beyond this, and a very slight retinal haze around the disk, there are no demonstrable changes in either it or in the retina. In the left eye the disk is more nearly circular; there are remains of a choroidal ring which has existed all around, but is now absorbed in places. The scleral ring is too marked all around, and outward there is a black speckled *conus* one and one-half times the width of the main retinal veins.

The patient was given $\frac{1}{33}$ of a grain of strychnia three times

daily; the quantity of this drug was gradually increased till he took $\frac{1}{16}$ grain at each dose, and in about a month, there was marked improvement, so that the accompanying field of the right eye could be taken with a Sherk's perimeter, candles being used for the fixation point and also for the peripheral object—the scotoma was outlined by the use of a black penholder—the candle-flame still being used



Field of right eye of A. H. A., showing extent and outline of central scotoma and limits of peripheral light perception.

for fixation. The vision was now $\frac{4}{CC}$, when the patient looked about six inches below the letter to which his attention was directed. The peripheral vision has so much improved that he can walk about with much greater confidence. The strychnia treatment was continued for some time longer, but apparently with no further improvement of the vision.

CASE II.—C. H. K., aged fifty years. He is a first cousin of the former patient on the mother's side, and complains of the same central cloud in his field of vision. The right eye distinguishes Sn. CC at one foot, the left, Sn. CC at five feet; in both cases with eccentric fixation. In a dark room, patient could distinguish through the central cloud, when looking directly at it (with the right eye), a gas-flame turned down to about the size of a usual candle-flame, and with the left eye, the same object when it was diminished to one-fourth of this size. Examination of the field with candles shows in right eye an irregular central scotoma, varying from about 15° to 20° around the point of fixation. The candle is seen most distinctly in the lower outer part of the field. In the left eye the

image is dim at fixation point, and there is a cloud extending from it in every direction about 5° below and about 20° above; vision much the best in the lower part of the field. The pupils here, too, were of medium size and prompt, but the patient is not so much inconvenienced by strong light as in the other case. The ophthalmoscope here, also, shows a greenish atrophy of the optic nerves, with entire want of capillarity of the disk, and but little change in the calibre of the central vessels. In each eye, the scleral ring is unduly marked all around the disk. A similar treatment was inaugurated, and after some weeks' use of the strychnia the central cloud was slightly diminished in density, and the peripheral vision markedly improved. The patient remarks that "now, when looking in the glass, he can see his own gray moustache." O. D. V. $= \frac{3}{CC}$; O. S. V. $= \frac{5}{CLXX}$; in both, eccentric fixation.

In both patients, the patellar tendon reflex was examined and found to be prompt.

These patients are first cousins, their mothers being sisters; and thus give a most interesting history of hereditary atrophy, beginning with the maternal great-grandfather and extending through four generations. The blindness has usually been transmitted by the female side of the house, and has affected both males and females, but the former much more frequently. It is noteworthy that an uncle, after being "blind," became so much better, that he could resume ordinary occupations, but this has not been the case in any other affected member of the family. The patients deny any consanguineous marriages. The following genealogical table exhibits the affected members of the family:

G.g.g.f. (affected). — G.g.f. (affected). — G. m. (affected).

- Uncle (affected, but improved). — Cousin (affected).
- Mother (not affected).
  1. A. H. A. (patient), male, 49 yrs. (affected).
  2. Female, 46 years (not affected).
  3. Died in infancy.
  4. Male, 43 years (affected).
  5. Died in infancy.
  6. Died in infancy.
  7. Female, 33 years (not affected).
  8. Died in infancy.
  9. Died in infancy.
- Aunt (affected). — Cousin, patient C. H. K., male (affected).

These cases form, to a great extent, a complement and contrast to those presented by typical pigment degeneration of the retina. They both have this in common, that they are frequently transmit-

ted from generation to generation, but in the one the affection starts always after puberty, often in middle life, with a neuritic atrophy of the optic nerve, and cuts off the central vision at the start, while peripheral vision remains comparatively unaffected. In the other, we have also an hereditary affection of the nervous system, localizing itself in the periphery of the retina often early in life, producing a secondary atrophy of the optic nerve and leaving central vision intact often for many years. Both are said frequently to arise from consanguineous marriages, but both often exist without any such cause.

Most of the individuals of this series became affected between the ages of twenty-five and forty years. The two who were my patients were much benefited by the persistent use of strychnia, which, although it failed to remove the central scotoma, so improved their peripheral vision that they could get about far more comfortably.

Treatment, however, in the great majority of recorded cases, has been unsatisfactory, and very different treatment seems to have succeeded in the hands of different individuals, showing either that the recorded improvements were the natural course of the disease uninfluenced by medication, or, what is more probable, that the various groups of cases are really different in their nature, and that we must endeavor by careful clinical study to further differentiate them. Thus Leber,[1] who has given us a most careful study of this subject and a *résumé* of its literature, remarks, that in his hands, even in the cases which subsequently improved, strychnia has been totally without effect. He recommends mercurial inunctions, and states that he once saw marked improvement after galvanization of the sympathetic in the neck—a proceeding which, however, in other cases proved unavailing. Graefe[2] saw marked improvement from systematic sweating, and Mooren[3] records the only complete cure with which I am familiar, obtained in a patient who came to him two weeks after the commencement of the affection, where, after five months' complete rest of the eyes, and the application of setons to the back of the neck, nitrate of silver was administered with such effect that the patient was able again without effort to read Jaeger 1 with either eye.

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[1] Arch. f. O., XVII., ii., pp. 249–291; and later in Graefe and Sämisch's Handbuch der Augenheilkunde, Vol. V., pp. 824–828.

[2] Graefe, A. f. O., IV., ii., pp. 266–268.

[3] Mooren, Ophthalmologische Mittheilungen, 1873, p. 88.

I cannot, however, but believe that in these, as in almost all other atrophies, that a certain degree of improvement in the *peripheral* vision is to be obtained by the persistent use of strychnia, and that *it is due not to any specific action on the nervous system, but to the fact that it so increases arterial pressure, as to drive a greater supply of blood into the shrunken capillary vessels of the optic nerve and retina, and thus restore proper nutriment to tissues which have been to a greater or less degree in a state of starvation.*[1]

REMARKS.

THE PRESIDENT remarked that the subject was one of considerable interest. A genealogical table was given in the last number of the new British *Journal of Ophthalmoscopic Science* of four generations of patients afflicted with retinitis pigmentosa, most of them minors.

DR. HARLAN, of Philadelphia, said that in the Institution for the Blind, in Philadelphia, there were patients in whose family a history of retinitis pigmentosa could be distinctly traced back seven generations.

DR. KIPP, of Newark, N. J., said Mauthner reported cases in which atrophy of the optic nerve was hereditary in a family several generations, but later color-blindness had developed instead of atrophy, while in the last members of the family the eyes were normal.

DR. LITTLE, of Philadelphia, mentioned the case of a family of Wilmington, Del., in which atrophy of the optic nerve could be traced back two or three generations.

[1] It is well known that strychnia is an excito-motor and stimulant to the nervous system, especially to the spinal-motor centres. Richter, however, has shown that it causes a very decided rise in the arterial pressure. Sigmund Mayer confirms this, and shows that the rise in blood-pressure is independent of the convulsions and of the frequency of the heart's action. He concludes that the rise of the arterial pressure is due to vaso-motor spasm. The later experiments of Schlesinger (1874) and Klapp (1878) further substantiate these statements. *Vide* a "Treatise on Therapeutics," H. C. Wood, 4th ed., p. 306.

THE INFLUENCE OF THE FARADIC CURRENT IN THE TREATMENT OF VITREOUS OPACITIES, WITH CASES.

BY WILLIAM S. LITTLE, M.D.,
PHILADELPHIA, PA.

THE presence of extensive vitreous opacities in the eye, while annoying to patients, is at the same time a preventive of an exact diagnosis as to the cause of the trouble, and a prognosis cannot be given till a view of the fundus of the eye is obtained.

While accepted plans of treatment do yield favorable results after a time, yet the sooner the media can be cleared up the better for both patient and physician. In hastening the process of removing vitreous opacities, I have found the Faradic current of value, combining medication with it.

My attention was first called to this in October, 1877, while treating a case of retinitis pigmentosa in a deaf mute, a male, aged fifteen, presenting at birth marks of a specific taint. Both eyes presented the lesion of retinitis pigmentosa to a marked degree. The right eye had a vitreous opacity to the nasal side, restricted in its movements, and the crystalline lens had a posterior polar cataract, slight in extent. I used the Faradic current for the condition of the retina, and with success, using at the same time, internally, iodide of potassium and mercury, and later strychnia. As the battery was used from time to time I observed the opacity in the vitreous of the right eye to decrease rapidly, far more so than where only medication had been resorted to in cases where vitreous opacity existed from various causes.

Since observing the improvement in this case, my note-book affords me the records of twelve cases of vitreous opacities, so serious in character as to prevent useful vision, and in which only medication and leeching has been resorted to, and while good results have been obtained, it took considerable time, the homes of the patients being so distant as to prevent frequent visits for the application of electricity.

During the past winter and spring several cases have afforded me

the opportunity to try the use of the Faradic current in addition to medical treatment, and the result has been more satisfactory as far as the time in treating the cases is concerned, and considerable diminution in the amount of medication.

The interrupted current has only been taken advantage of; the influence the constant current might have has not been attempted.

The cases which are here reported are those where the vitreous opacities were due to change in the retinal or choroidal circulation. That it would be valuable in any form of hyalitis I have no doubt, and would suggest the application of the Faradic current to those cases having vitreous opacities from changes in the eye due to myopia, and in those cases of vitreous opacities from presence of foreign bodies in the eye, so as to clear up the vitreous to enable a view of the fundus, so as to locate the foreign body, or see the damage done before enucleation, if that is required.

Carnus Henri, Thèse de Paris, 1874, reports the advantage of the constant current in opacities of the vitreous (Jahresbericht, 1875, published 1877, p. 193, eight cases treated).

Dor reports the good result of electricity in retinitis pigmentosa (Jahresbericht, 1872, published 1874, p. 380; also in Jahresbericht, 1877, published 1880, p. 198).

The improvement in the cases treated by electricity is not due to the stimulation of the nerve or retina, that of course being done, but to actual diminution of the opacities in the vitreous; as the improvement in vision remains constant and as it clears up, the ophthalmoscope can be used to see the improvement in reduction of their size and density, till a good view of the fundus is at last attained. The time required varies according to the size and density of the opacities. I have found one, two, or three weeks all that is necessary, application being made every other day, feeble at first, and gradually increased in length of time of application, and amount of electricity used, the applications being made from one hand and to the eyeball on the same side, or from the hand of the opposite side, or one pole can be applied to the nape of the neck, the other on the eyeball.

Four cases are reported recently under treatment.

Case I.—J. F. D., male, aged twenty-nine; physician; Pennsylvania; seen February 17, 1882. In December, 1881, suffered from attack of diphtheria; confined to bed for one week; second day of attack the left eyeball became troublesome, sclerotic injected, intolerance of light and gradual loss of sight. Vision same now as at the worst; used atropia. Ophthalmoscope gives only slight reflex.

R. E., V.=$\frac{20}{XX}$ H+6o, field normal. L. E., V.=$\frac{1}{CC}$, field normal.

The vitreous was opaque and gave very dark reflex.

Potassii iodid. and hydrarg. bichlor. were ordered. Leeches to the temple. I advised also the application of a weak Faradic current to the eye every other day. Patient returned April 6, 1882; there had been a rapid improvement in vision.

L. E., V.=$\frac{1\Delta}{XL}$.

Floculi through vitreous; can see fundus so as to exclude any serious lesion of nerve or retina. July 29, 1882, writes nearly returned to normal vision; reads newspaper easily.

CASE II.—R. W., female, aged thirty-six; Pennsylvania. During June, 1881, compelled to give up work on account of general health and visual trouble; had suffered from rheumatism, sore throat; hair fallen out. Attack of Bell's palsy on right side; cornea affected, as seen by opacities now present. A few weeks later the left side was attacked with Bell's palsy, as the right side was getting better.

Vision had failed since the right eye was first attacked. Appropriate treatment was given by a capable physician.

No specific history made out. Severe pain in head at times, hearing was modified and taste also, sense of smell reduced.

R. E., V.=$\frac{1\Delta}{C}$; cannot continue near work or read. L. E., V.=$\frac{1\Delta}{C}$; cannot continue near work or read.

Ophthalmoscope reveals large opacities in vitreous, preventing view of fundus in each eye. Potassii iod. and hydrarg. bichlor. ordered.

April 6th, applied Faradic current. R. E., V.=$\frac{1\Delta}{L}$; after battery, $\frac{1\Delta}{XX}$. L. E., V.=$\frac{1\Delta}{LXX}$; after battery, $\frac{1\Delta}{XXX}$.

April 8th.—R. E., $\frac{1\Delta}{XX}$; after battery, $\frac{1\Delta}{XV}$. L. E., $\frac{1\Delta}{XXX}$; after battery, $\frac{1\Delta}{XX}$. Snellen 0.8 at 12."

April 11th.—R. E., $\frac{1\Delta}{XX}$; after battery, $\frac{1\Delta}{XV}$; three letters in line. L. E., $\frac{1\Delta}{L}$; after battery, $\frac{1\Delta}{XXX}$.

April 14th.—R. E., $\frac{1\Delta}{XV}$; after battery, $\frac{1\Delta}{XV}$; four letters in line. L. E., $\frac{1\Delta}{XXX}$; after battery, $\frac{1\Delta}{XX}$; two letters in line. Ordered strychnia.

April 17th.—R. E., $\frac{1\Delta}{XV}$; L. E., $\frac{1\Delta}{XX}$; after battery, $\frac{1\Delta}{XV}$; one letter.

April 20th.—Says sees much better for far and near all the time. R. E., $\frac{1\Delta}{XV}$; after battery, $\frac{1\Delta}{XV}$; four letters in line. L. E., $\frac{1\Delta}{XX}$; after battery, $\frac{1\Delta}{XV}$; three letters in line.

April 24th.—R. E., $\frac{1\Delta}{XV}$; four letters in line. L. E., $\frac{1\Delta}{XX}$; four letters; after battery, $\frac{1\Delta}{XV}$; one letter. Says she has been able to do work not done since she was first taken sick. Ophthalmoscope shows disk in each eye distinctly. a+6D shows thin opacities in vitreous.

May 5th.—Corrected in R. E., Ah+60 cyl. ax. 90°.

May 9th.—Corrected in L. E., Ah+48 cyl. ax. 90°.

June 15th.—R. E., V.=$\frac{1\delta}{XV}$; very fine opacities exist in vitreous. L. E., V.=$\frac{1\delta}{XX}$; slight opacities exist in vitreous.

July 6th.—Her vision is the same; hearing better; taste and smell as acute as ever.

CASE III.—W. F. C., male, aged thirty, New Jersey; Jefferson Medical College Hospital. Seen March 31, 1882. Suffered from sunstroke three years ago, vision bad since. Has an eruption over face and about the body, which has been present almost continually since childhood. Denies specific taint. No glasses help him in seeing; is unable to read or write, as the words are lost as he views them.

Posterior polar cataract exists in each eye; also large, dense vitreous opacities are present in each eye; no view of the fundus of either eye obtainable with the ophthalmoscope. Some pain in eye last three months. Potassii iodid. given.

April 5th.—R. E., V.=$\frac{20}{LXX}$. L. E., V.=$\frac{20}{C}$ ($\frac{20}{LXX}$?).

April 7th.—R. E., V.=$\frac{1\delta}{XV}$; after battery, $\frac{1\delta}{XV}$; letter 0.5 at 12″. L. E., V.=$\frac{1\delta}{L}$; after battery, $\frac{1\delta}{XXX}$; letter 1.25 at 6″.

April 10th.—R. E., V.=$\frac{1\delta}{XX}$; after battery, $\frac{1\delta}{XV}$. L. E., V.=$\frac{1\delta}{L}$; after battery, $\frac{1\delta}{XL}$.

April 14th.—R. E., V.=$\frac{1\delta}{XV}$; after battery, $\frac{1\delta}{XV}$. L. E., V.=$\frac{1\delta}{XL}$; after battery, $\frac{1\delta}{XXX}$.

April 17th.—R. E., V.=$\frac{1\delta}{XV}$. L. E., V.=$\frac{1\delta}{XX}$; after battery, $\frac{1\delta}{XV}$.

April 20th.—R. E., V.=$\frac{1\delta}{XV}$. L. E., V.=$\frac{1\delta}{XXX}$; after battery, $\frac{1\delta}{XX}$.

April 24th.—R. E., V.=$\frac{1\delta}{XV}$. L. E., V.=$\frac{1\delta}{XX}$.

April 28th.—R. E., V.=$\frac{1\delta}{XV}$, H+48. L. E., V.=$\frac{1\delta}{XX}$, H+48.

Been able to observe change in choroid and retina since April 14th, in the left eye existing at the fovea.

Vitreous cleared so as to examine the fundus of each eye perfectly with the ophthalmoscope.

The changes in posterior portion of lens are annoying.

May 13th.—R. E.,+48, V.=$\frac{20}{XXX}$. L. E.,+48, V.=$\frac{20}{LXX}$.

Is able to read and write without discomfort, and is doing his work, that of a station-agent on the railroad.

CASE IV.—Mrs. W., aged forty-seven; Pennsylvania. Seen June 1, 1882.

R. E. enucleated June 5, 1882, having been lost by a blow some years ago; had no perception of light. L. E., V.=$\frac{1}{CC}$ with−3 worn now some time. Large vitreous opacities exist in the left eye, and changes in the fundus due to the myopia. Given potassii iodid.

June 10th.—Find—2⊃—6, cyl. ax., 70°; V.=$\frac{6}{LXX}$.
Applied the battery June 17th. V.=$\frac{1A}{CC}$.
As she returned home, could not be used.
Seen August 16th. L. E., V.=$\frac{1A}{CC}$ or $\frac{A}{XL}$.
Reads Snellen 1.25 at 12″.

Vitreous is much clearer, but changes due to posterior staphyloma prevent any further improvement. The left eye is much stronger since enucleation of the right eye.

REMARKS.

DR. JOHN GREEN, of St. Louis, referred to the case of a woman who had received specific treatment, on whom he used at first the weak Faradic current, and afterward a stronger one, for opacities of the vitreous. It was rather astonishing to note the improvement which took place from the beginning of the treatment.

THE PRESIDENT remarked that we all knew how difficult it was to cause contraction of the recti muscles of the eye by the Faradic current, and the question arose in his mind, how deeply the current entered during its employment in this manner.

REPORT OF A CASE OF GLIOMA IN A PATIENT TWENTY-ONE YEARS OF AGE.

BY C. S. MERRILL, M.D.,
ALBANY, N. Y.

THE occurrence of glioma of the retina in a patient at so advanced an age, twenty-one years, makes it seem proper that this case should be recorded; therefore I present it for your consideration.

George S., of Binghamton, twenty-one years of age, a cigar-maker, small of stature, but always enjoying good health, presented himself at the Albany Hospital, October 2, 1878, stating that fourteen months before he had noticed a cloud coming over left eye, shutting off the outer and upper portion of the field of vision. In the course of ten months the entire field was covered, and the eye had lost all perception of light. He stated that for the last ten months he had had, at times, severe pain in the eye.

The tension was not increased. The ophthalmoscopic appearances were most interesting and remarkable.

There was complete detachment of the retina, which hung in cir-

cular folds, and presented the characteristic yellowish appearance of glioma.

I diagnosed the case as one of glioma, and advised enucleation of the eye. Knowing that there was no case on record in the literature of the subject of glioma occurring at so advanced an age, I requested the man to go to New York and see others. He did so, and there saw Drs. Agnew, Webster, and Knapp.

Dr. Knapp, in a letter written Dr. Agnew concerning the case, stated that he considered it as probably one of glioma, though he was not willing to express a definite opinion from the one examination.

Dr. Agnew was disposed to consider it a mixture of glioma and sarcoma. Both concurred in advising enucleation.

On November 15th, I removed the eye before my class. A portion of the greatly thickened retina was given Dr. William Hailes, for microscopical examination, who pronounced it a case of pure glioma.

The eye was treated with Müller fluid, after which Dr. Hailes made a further examination, and in his report says: "I find the growth to consist almost entirely of small round cells, bordered by remnants of the retinal elements, more or less recognizable. A section of optic nerve posterior to sclera shows the nerve at that point to be entirely free of glioma cells. The growth developed from the retina, and possesses the characteristic structure of a glioma."

The removal of the eye relieved all pain, and there has been on return of the growth. I saw the patient for the last time two years ago, when there were no evidences of return, and V. of right eye was as it had been from the first, $\frac{20}{xx}$.

I wrote to the patient last week and received an answer from his sister, saying that his health had continued perfectly good till about a year ago, when he developed lung trouble—phthisis—has rapidly failed, and is expected to live but a few days.

In his right eye, when he was first seen, there were three or four peculiar grayish-white patches in the periphery of the fundus, which, I feared, might be the beginning of similar trouble in that eye; but, after the removal of the left eye, they almost entirely disappeared. One year later they were very marked. In two months they nearly disappeared again, while using mercury, and as far as I know never returned.

A CASE OF ANÆSTHESIA OF THE RETINA, WITH CONCENTRIC LIMITATIONS OF THE FIELDS OF VISION—RECOVERY THROUGH INHALATIONS OF NITRITE OF AMYL.

BY RICHARD H. DERBY, M.D.,
NEW YORK.

PATIENT, Helen P., aged eight; a nervous, excitable child; grown rapidly in last year especially; has recently convalesced from severe attack of scarlet fever. Was brought to me March 30, 1882, complaining of pain in and about the eyes and defective sight.

Vision, O. D. (Monoyer) .6, O. S. .5. The next day eyes examined under atropine. Vision as before; no improvement with glass. On each eye very marked concentric limitations of the fields.

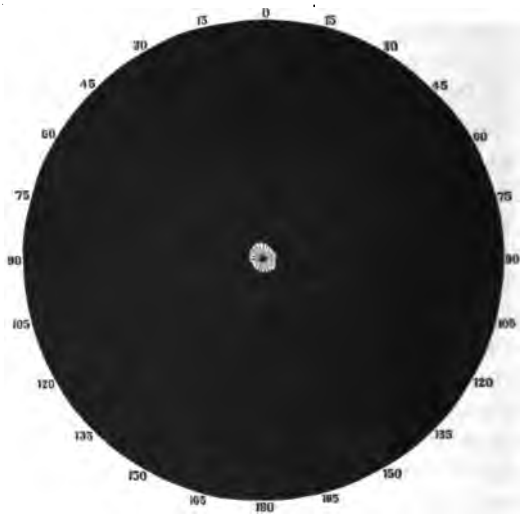


FIG. 1.

By the perimeter the vertical and horizontal diameters of the fields not exceeding 10° (Fig. 1); with the ophthalmoscope no change noted. Patient was given small doses of oxide of zinc, and directed to wear coquilles.

On April 5th, Vision O. U.=.4.

On April 10th, Vision O. U.=.5.

On June 1st, patient's mother reported her vision worse; that the child stumbled over pieces of furniture in the nursery. Vision O. U. .2; fields of view limited as before; optic discs are paler in their outer halves than before; the papillæ have lost their capillary blush. This fact was confirmed by Dr. E. G. Loring, who examined the case. Upon consultation it was decided to use inhalations of nitrite of amyl. An inhalation of three drops of nitrite of amyl was given, followed by marked flushing of face; no change in vision.

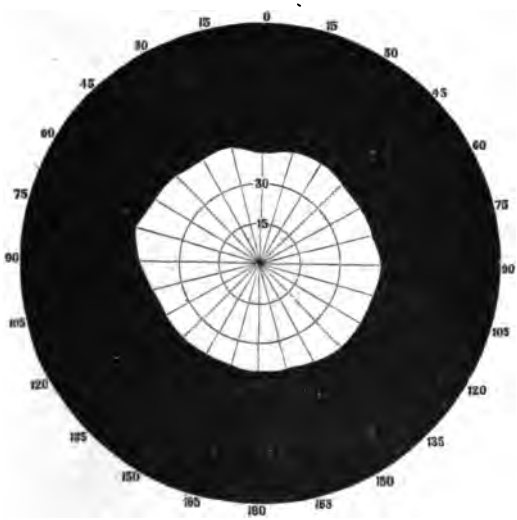


FIG. 2.

June 2d.—Vision O. U. .2; again amyl inhalations; after this, Vision =.3 (?). Patient complains of pain over top of head, and that she cannot bear the contact of comb with scalp. The nitrite of amyl inhalations continued daily (three drops).

June 3d.—Vision =.3 (four letters).

June 8th.—Vision =.6; the right visual field found enlarged; after measuring this with the perimeter, vision of this eye after inhalation .8 nearly.

June 9th.—Vision .9 nearly.

June 10th.—Vision 1; again enlargement of field (Fig. 2).

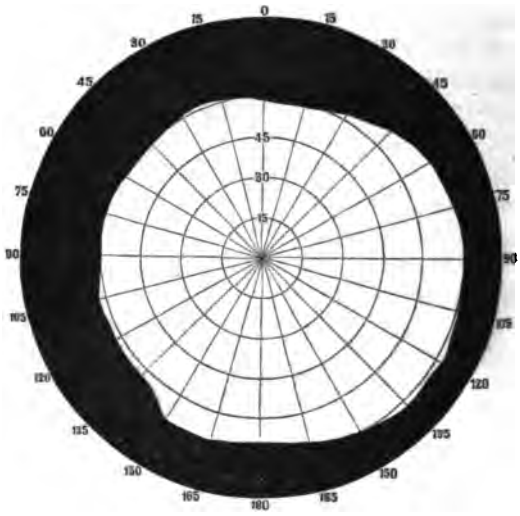


FIG. 3.

June 12th.—Field of vision enlarged (Fig. 3).

June 19th.—For several days patient has been in the country; fields of view normal (Fig. 4); Vision 1. The perimetric diagrams

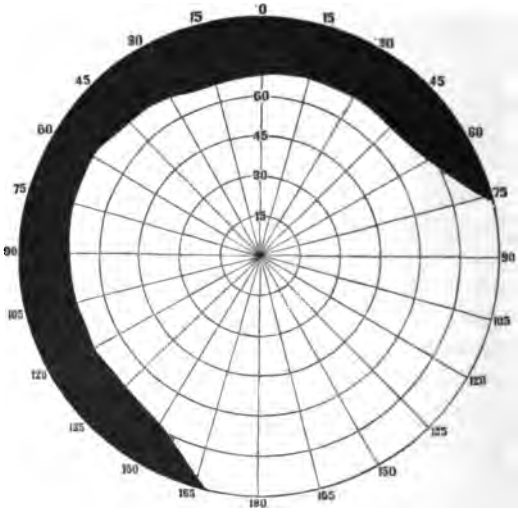


FIG. 4.

of the field of view are all of the left eye, but at no time was there a marked difference of the two visual fields.

In this case the interesting feature is, the very marked depreciation of vision, the unusual degree of concentric limitation of the fields, both persisting for two months or more, and the relief following the use of nitrite of amyl, and that relief maintained. Cases of anæsthesia of a zone of the retina are by no means uncommon; they occur ordinarily among children, and as a consequence of scarlet fever, they have been frequently noted.

That which gives the present case whatever interest it may have, is the persistence of the trouble, the signs of partial atrophy of the optic nerve, and the prompt clearing up of the difficulty under nitrite of amyl.

Of the use of nitrite of amyl in cases of anæsthesia of the retina I can find nothing in literature. Oscar Berger[1] relates the case of a lady, twenty-four years of age, who suffered from left-sided migraine at the period of menstruation and occasionally between periods, the attacks beginning usually in the morning, reaching their height at noon, with vomiting, the migraine lasting until night. In one of these paroxysms patient inhaled five drops of amyl and the pain was banished at once (weggebannt).

The use of the amyl in the partial temporary blindness (Flimmer —scotoma), familiar to all ophthalmic surgeons in these cases of migraine, suggests itself at once, as does its use in certain cases of cerebral amblyopia, of which the following, from my private case book, may be taken as a type: Judge R., aged fifty-nine, eight days before consulting me first noticed right-sided hemiopia; patient always myopic, reads without glasses. There was defect of visual fields or uncertainty in every direction. Patient said, "I can only read by following on letter by letter, but I cannot see the whole of words." The history of the case was one of occasional alcoholic abuse, and at times great mental strain. He had unnatural pallor of face, was disposed to sleep at all hours. Examination of urine showed nothing abnormal. Beyond a slight posterior staphyloma *there was no ophthalmoscopic change.* The central vision reduced to $\frac{1}{2}$. Under use of Heurteloups at temple and tonic treatment patient recovered the integrity of visual fields and the vision rose to .7, the treatment lasting a period of nearly three months.

Whether or not in this and similar cases we have to do with capil-

[1] Berlin. klin. Wochenschr., January 9, 1871, p. 21.

lary contraction and consequent interference with nutrition of the nervous centres, may well be a matter of speculation. Further experiments are certainly justified in the use of an agent which, in the case here narrated, clearly was efficient in bringing prompt relief.

REMARKS.

DR. HARLAN said that he had no experience in the use of nitrite of amyl in anæsthesia of the retina, but could refer to a case in which it had been used with great success in hyperæsthesia. The patient was a nervous girl about eighteen years of age, who, without any disease of the eyes, had such intense photophobia that it was impossible to see even the cornea without etherization. Ophthalmoscopic examination under ether showed the fundus to be normal. After trying every remedy that he could think of, or that could be suggested by his colleagues at the Wills Hospital, where the girl was under treatment for a year, she was entirely cured by three or four inhalations of the nitrite. It was administered by the resident surgeon, in larger doses than he should, at that time, have ventured to use—of one drachm each. He had tried the remedy in other cases, but without effect.

DR. S. D. RISLEY, of Philadelphia, had not had experience with this drug in anæsthesia or hyperæsthesia of the retina, but he had used it in overcoming photophobia from corneal disease in a number of instances in children. In the case of a man with granular lids and corneal disease, with excessive photophobia, the relief was so great immediately on inhaling it that he could look out of a very light window. But the dread of light would return within an hour.

THE PRESIDENT referred to a case which he reported to the New York Ophthalmological Society in the spring of this year. A mechanic, fifty-five years of age, while talking, gradually began to lose sight. Everything grew dark, and in about ten minutes he was blind, and had to be led home. He continued in this state of complete want of perception of light from 2 P.M. until nearly 6 A.M. At 2 P.M., twenty-four hours after he lost sight, he was brought to the infirmary, where the president saw him. He was able to recognize light, and had a dim perception of form. After careful examination with the ophthalmoscope he pronounced the man to be suffering from what was formerly called palsy of the retina. There was almost entire suspension of the retinal circulation. V. $\frac{2}{C}$. He was put under the influence of nitrite of amyl, and in five minutes he had completely recovered. V. $\frac{20}{XX}$.

The President also narrated a case, asking the members if they had had any similar experience. A child in Chicago had an extremely mild attack of scarlet fever, from which it soon recovered, afterward suffering from a certain amount of conjunctival trouble. Dr. Lyman Ware, of Chicago, was consulted, who told the parents that the child had retinitis. Later, the child was brought East, when

the president saw it, and found a typical case of papillitis, choked disk; V. $\frac{20}{XX}$. No limitation of field, no impairment of ocular perception, no albuminuria or kidney trouble, no headache, no constitutional trouble. It was the only case he had seen of double papillitis succeeding scarlet fever without symptoms of kidney trouble or with perfect general health. Dr. Knapp remarked that a similar case had been reported to this society, but he was unable to say whether the patient had had scarlet fever or whether it was measles.

DR. HASKET DERBY, of Boston, mentioned the case of a young man, aged eighteen, who, under ophthalmoscopic examination, was found to have the condition the president described. It was a beautiful case of choked disk; the outline of the disk had entirely disappeared. There was no effect upon the field of vision; V. $\frac{20}{XX}$. in each eye. Perfect sight. No constitutional symptoms. The papilla had not returned to its normal condition when he saw the patient last.

DR. L. HOWE, of Buffalo, N. Y., spoke with regard to what might be attributed to the medicine given, and what to the natural course of things when relief was obtained from palsy of the retina. A certain lady had lost her sight completely, but within eight or ten hours it returned, coming back gradually. Her sight was then practically normal. During the past six weeks, however, she had a return of exactly the same condition. He gave no treatment, thinking a like favorable result would take place. The president here remarked that he had seen a number of cases recover without any interference, but in this case he gave the nitrite of amyl to hasten recovery.

DR. RISLEY remarked, with regard to the fact that choked disk might be present and sight still remain perfect, that he had examined a large number of persons whose sight was said to be perfect, and in quite a number he found the typical appearances of choked disk. No complaint was made by them of headache, of asthenopia, or diminution in sharpness of vision.

REMAINS OF THE HYALOID ARTERY ATTACHED TO THE CRYSTALLINE LENS—ANÆSTHESIA OF THE RETINA.

By W. S. LITTLE, M.D.,
PHILADELPHIA, PA.

Miss W., aged twenty, was seen at the Jefferson Medical College Hospital, Eye Department, on November 29, 1881. Had been compelled to give up her work, that of a weaver, and also clerical work afterward adopted, on account of her poor vision.

R. E., V. $= \frac{1}{cc}$; peripheral limitation of field. L. E., V. $= \frac{1}{c}$; peripheral limitation of field.

Blepherospasm and photophobia were present to a limited degree.

Stated her eyes had been sore when five years of age; shows now no trace of disease that then existed.

The symptoms she had been suffering from for some months were attributable to hysterical copiopia.

The first ophthalmoscopic examination showed remains of the hyaloid artery in the right eye attached to the crystalline lens; between the optic nerve and the crystalline lens it was oscillating, the central vessel passing from the nerve directly to the posterior surface of the crystalline lens contained a dark material about the middle of its course, only the adventitia of the vessel was present elsewhere; it appeared as a delicate piece of lace-work, except where pigmented, against the red fundus for a background.

The general course of the vessel is nearly the same as occurred in the case of persistent hyaloid artery I reported, and the chromolithograph of which appears in the "Transactions of the American Ophthalmological Society" for the year 1881, only in that case the attachment to the crystalline lens was wanting, and blood was traversing the vessel.

The observation of this case now described gives me more confidence in asserting the other case as being a true persistent hyaloid artery, and the two cases taken together are quite unique. The vision was not impaired in either case to any extent by the presence of the vessel.

A Crescentic Notch in Margin of Lens

The left eye of this same patient shows slight traces of the adventitia of the hyaloid artery close to the disc.

Dr. J. Madison Taylor, of Philadelphia, Pa., has made a very accurate drawing of the case, a colored drawing of which I present to the society.

A detailed course of the vessel is not necessary.

Under a mydriatic, I found R. E., +48, cyl. ax. 90°, V.=$\frac{20}{xx}$, field limited. L. E., +60, cyl. ax. 90°, V.=$\frac{20}{xx}$, field limited.

The case remained under observation and treatment for some weeks, her vision still being defective; her family physician reported no uterine trouble. Shortly afterward she was married, and she came to see me soon after her wedding trip, when I found the limitation of the field of vision had vanished, and her sight was again good, she wearing the glasses correcting her optical defect.

Her sister has recently been a patient; myopia exists, and I have observed in her left eye slight traces of the hyaloid vessel close to the disc.

CIRCUMSCRIBED ABSORPTION OF THE LENS, APPARENTLY OF TRAUMATIC ORIGIN, WITHOUT THE REMAINDER OF THE LENS BECOMING OPAQUE.

(*With Chromo-lithograph.*)

BY SAMUEL THEOBALD, M.D.,
BALTIMORE, MD.

MRS. H., about thirty years of age, sought advice because of a recurrent dimness of sight in the right eye, after prolonged use of it. The eye exhibited no external signs of inflammation. A small dense opacity was observed in the cornea near its outer margin, and to this a slender tag of iris was adherent, the pupil, as a consequence of this, being displaced toward the point of attachment. With this eye the patient had V.=$\frac{20}{xx}$ (?), and could read J. No. 1, the range of accommodation being but little, if at all, less than in the other, and about corresponding with what she was entitled to at her age. A strong solution of atropia having been instilled the pupil dilated promptly, and then with the ophthalmoscope and by oblique illumination the periphery of the lens was seen to be defective, a well-defined crescentic notch being discovered in its margin, in a line

with, and directly behind the corneal scar and iritic adhesion. A layer of opaque lens substance, apparently about ½ mm. in thickness, formed the boundary of the notch, and beyond this, but in close proximity to it, there were several small punctate opacities; none of these, however, were opposite the area of the undilated pupil, and the rest of the lens was of normal transparency. The fundus of the eye could be seen with the ophthalmoscope either through the notch or through the lens; it exhibited no pathological changes, but several floating opacities were discovered in the anterior portion of the vitreous humor.

The patient had no knowledge of this eye ever having been injured, nevertheless there seems to be little room for doubt that the corneal scar, the anterior synechia, and the circumscribed absorption of the lens were the result of a penetrating wound—received, probably, in childhood—which involved the capsule of the lens as well as the cornea and iris. Why the cataractous process should have been arrested in so singular a manner is a question difficult of explanation.

Atropia was prescribed, in the hope of tearing through the slender iritic adhesion, and so improving the condition of the eye, but the patient becoming alarmed at the effect it produced upon her accommodation, discontinued its use after a day or two, and nothing was accomplished by it.

REMARKS.

In reply to a question by Dr. Kipp, whether this crescentic notch in the lens might not have been congenital, DR. THEOBALD replied that while that possibility could not be excluded he did not think it was the probable explanation in this case; doubtless it was a scar of traumatic origin.

DR. KNAPP remarked that there sometimes seemed to occur a disturbance of development, resulting in an adhesion between the cornea, iris, and lens, forming a notch in the lens with a kind of partial cataract, presenting the appearance described by Dr. Theobald, and he would rather be disposed to leave the question an open one, whether this case were of congenital or traumatic origin. In reply to a question by the president, whether these notches in the lens were not more likely to occur in the vertical margin than in any other portion of the lens, Dr. Knapp replied that he had not so found it as a rule.

In reply to a question, THE PRESIDENT said he had seen persons who were born with inflammation of the iris, posterior synechia, and opacity of the cornea.

A FRAGMENT OF GLASS IN THE EYE, PROBABLY IN THE CILIARY BODY, FOR TEN YEARS, WITHOUT PRODUCING SERIOUS CONSEQUENCES.

BY SAMUEL THEOBALD, M.D.,
BALTIMORE, MD.

JUNE 5, 1872.—Mr. W., twenty-one years of age, hastened to my office because of an injury which he had just received to the left eye, from the accidental explosion of a glass test-tube, with which he was engaged in making some experiments. Upon examination by oblique illumination a small penetrating wound was discovered in the upper and outer margin of the cornea, and attached to the inner extremity of this by a slender shred of tissue, dangling in the anterior chamber, was seen a tiny, irregularly shaped fragment of glass. It hung on a level with the lower margin of the pupil, and rested at one moment upon the lens, and at another upon the iris, as the pupil varied in size. A drop of atropia having been instilled, after an interval of five or six minutes the eye was again examined. The pupil had just begun to dilate—*and the fragment of glass had disappeared.* It had evidently fallen through the pupil, behind the iris, for diligent search failed to discover it in the anterior chamber. Although it could not be seen in its new position, it was clear that, through its gravity, it had found a lodgement below, in the ciliary body.

In view of the serious apprehensions excited by this misadventure, but little surprise was felt when the eye was found on the following morning—in spite of a one-grain solution of atropia, which had been prescribed—decidedly more injected and markedly photophobic. A four-grain solution of atropia, to be instilled every three hours, with ice-water compresses and a mercurial purgative, were now prescribed; but, notwithstanding these remedies, and the application the next day of the artificial leech, and the use of a fomentation of belladonna, the condition of the eye grew steadily worse until June 10th, five days after the accident. The patient was then suffering considerable pain; the eye was much injected; its vision had fallen to $\frac{20}{XL}$, its tension to —T. 1, and there was decided

tenderness of the ciliary region; in addition to which there was, for the first time, a muddiness observable in the lower portion of the iris. However, though the patient had taken but four grains of calomel in the two purgative powders which had been administered, he now complained of a bad taste in his mouth, and of an unusual inclination to spit. I mention this fact because, if it were not connected with the cause, it was at least the precursor of the pronounced change for the better in the condition of the eye which manifested itself during the next twenty-four hours, for the day after the eye was free from pain; V. had improved to $\frac{20}{XXX}$, T. was nearly normal, and the tenderness of the ciliary region had greatly diminished. In the treatment no change had been made, except the application of cantharidal collodion behind each ear.

From this time on the eye rapidly improved, and on the twenty-first day after the receipt of the injury—all treatment having been discontinued a week previous—it was entirely free from inflammation, had V.$=\frac{20}{XX}$, and could make out J. No. 1 with ease. The ophthalmoscope showed a clear lens and a healthy fundus, but the fragment of glass could not be detected. An examination made twelve months later, and still another, two years after the injury, showed no change in the condition of the eye.

To complete this report I have again, within the past few days, carefully re-examined the eye, without finding any trace of the old hurt, except a scarcely perceptible opacity at the site of the corneal wound. V. is still $\frac{20}{XX}$, and J. No. 1 is read as promptly with this eye as with the other; indeed, Mr. W. was in some doubt as to which of his eyes had been injured, and assured me that he was conscious of no difference between the two. Doubtless the inflammation, which followed immediately after the accident, caused the fragment of glass to become encysted, and to this, as well as to the chemical nature of the glass, may be ascribed the exceptionally favorable progress of the case.

REMARKS.

DR. JOHN GREEN, of St. Louis, saw a man in whom a piece of percussion-cap had lain in the lens, a little to one side, for many months without producing general opacity. The line of demarcation was very clearly observable, and the foreign body on casual inspection looked like a wedge. There was a little evidence of atrophy of the pupillary margin at that particular part, as if frequent touching of the point of the object had produced some atrophy of the tissue. The case passed from under his observation.

DR. T. R. POOLEY, of New York, was reminded by Dr. Knapp of a case he saw a few days ago, similar to the one described by the author. A fragment of glass was apparently imbedded in the structure of the iris, situated midway between the pupil and the attached margin of the iris. It was triangular in shape, about three millimetres in size, and the accident occurred about twenty years ago, when the patient was engaged as a glazier. It had given exceedingly slight trouble from time to time, and on this occasion the patient consulted him because of a little redness of the eye. The foreign body could be removed, but there was no indication for it.

DR. KNAPP, of New York, thought the tolerance or intolerance of foreign bodies in the eyes depended more upon their size than upon other conditions. The danger from uncleanliness was, in his opinion, commonly exaggerated. Unless they were chemically destructive or composed of an irritant substance, we frequently saw that the most different kinds of foreign bodies were tolerated in the eye.

THE PRESIDENT said that last winter a patient was presented to the New York Ophthalmological Society, in whose lens was imbedded a piece of iron which had penetrated the cornea seventeen years before. Every now and then some physician wished to remove it, but fortunately none had had the opportunity to do so yet.

DR. C. J. KIPP, of Newark, N. J., had under care a practitioner of medicine, in whose retina probably was a piece of percussion cap about the size of a millimetre, which had remained there about eighteen years without causing irritation or affecting the sight.

THE PRESIDENT said, in connection with Dr. Knapp's remark, that he had to enucleate the eye of a boy which had been penetrated by a piece of copper percussion-cap, the piece lodging in the lens, causing total absorption of the lens substance, exciting cyclitis, which led to the operation lest sympathetic trouble should develop in the other eye.

DR. KNAPP here remarked that he did not say all small bodies were innoxious, but that in order to be innoxious they, as a rule, must be small.

A CASE OF EXTENSIVE HEMORRHAGE BETWEEN CHOROID AND SCLEROTIC.

BY G. HAY, M.D.,
BOSTON, MASS.

MR. ——, aged fifty-six, had generally enjoyed fair health, though occasionally had had dyspepsia.

He was first seen by me May 21st. The right eye presented extensive ecchymosis of the bulbar conjunctiva. The affection had begun a few days previously with serous chemosis of this part, and some of its vessels enlarged. The eye was not hard; its vision said to be good. The ophthalmoscope showed the media clear and no synechiæ. The pupil had been dilated by atropine.

May 30th.—No appearance of serous chemosis. The ecchymosis less. The patient in good spirits. The case seemed to be improving.

June 1st.—I was again asked to see the case. The patient spoke of some soreness in the region of the malar bone. The upper lid was slightly swollen. The bulbar conjunctiva much injected. Tension full, but hardly too much. Pupil somewhat dilated from the previous atropine, now discontinued. Says he sees with the eye, but, on being questioned, not quite as clearly as with the other.

June 4th.—Had pain about the eye last night. Now, more serous chemosis; bulbar conjunctiva still injected. Some slight discoloration of anterior chamber. Pupil as on the other side. Vision not as good as that of the other eye. Patient seems feeble.

June 6th.—Medial aspect of bulbar conjunctiva seems somewhat thickened.

June 8th.—By ophthalmoscopic examination the pupil does not light up as well as the other, and does not dilate as well.

June 10th.—Under atropine, patient looking up, the ophthalmoscope shows a somewhat globular, rather large, grayish swelling coming into view from above. When patient looks down, a dark mass, less sharply defined, appears from below.

As the case was unusual, it was thought proper to get additional opinions. The patient consulted Drs. Derby and Wadsworth, each

of whom considered the case to be one of intraocular tumor. I also adopted this view, as focal illumination showed at the upper part of the inside of the eye a surface which appeared stationary, somewhat raised from the normal position of the choroid, slightly uneven, and finely mottled with red and yellow.

It should be added that Drs. Derby and Wadsworth each saw a vessel on the upper mass.

June 13th.—The eye was enucleated and placed in Mueller's fluid. On the 26th, the specimen, opened by a nearly vertical section, showed the anterior half of the choroid separated from the sclerotic very extensively all around, not merely above and below, by a layer of blood which was in some parts three-sixteenths of an inch thick, and extended between the membranes into the posterior half of the eye, where it gradually became less thick.

I am indebted to Dr. Wadsworth for the following measurements: The separation extended from attachment of ciliary muscle to within about 10 mm. from the disc; the thickest part was about 10 mm. from attachment of ciliary muscle, and the thickness was there, above and below 5½ mm.; the separation extended all around, but at the outer side and inner side was much less—especially less on the outer side.

The combination of symptoms in this case is rare—choroidal separation is rare. When a separation of the choroid is owing to the effusion of a serous fluid, it may, if the ciliary region is not involved, be easier to recognize. But when it is caused by the interposition of blood, the intraocular appearances may resemble those of choroidal tumor.

In the case reported it may be thought that the conjunctival ecchymosis might have indicated the real nature of the intraocular affection, and yet the question presented itself whether a tumor, or some other disease of the ciliary body, might not give rise to the external ecchymosis.

As to the apparent rapid growth of the supposed tumor, we might have supposed an exceptionally rapid growth, complicated, perhaps, with hemorrhage.

REMARKS.

Dr. Knapp, of New York, said the case resembled exactly the one which he had described and illustrated in his treatise on intraocular tumors. In that case he fell into the same error in diagnosis, believing it to be a sarcoma, which it resembled so closely by

oblique illumination, presenting the nodular appearance, etc. In that case the error was more liable to occur because of absence of a history of inflammation. We at least learned the lesson to be cautious in these cases.

DR. T. R. POOLEY, of New York, said a similar case to the one described by the author appeared at the New York Eye and Ear Infirmary a good many years ago, and was reported to this society. Both eyes were enucleated for supposed glioma, but were afterward found simply to be affected by a bloody tumor lying between the choroid and retina in either eye.

THE PRESIDENT inquired whether detachment of the choroid from other fluid than blood had been observed by members of the society. It was one of those lesions which were put down in the books, but he could not recall having seen an illustration of it unless it were accompanied by severe inflammatory action. In this connection he would mention a condition which he had repeatedly observed, and which, when he first saw it, deceived him into the belief that there was detachment of the choroid. If one looked into the fundus in some cases of detachment of the retina where the fluid beneath the retina was transparent and perhaps not very abundant, and traced the fluid to a point where it became but a very thin layer, then illuminated the eye obliquely, so that the light came not directly upon the spot being examined, but upon the adjacent portion, a phenomenon was very often produced which, when he first saw it, led him into the belief that it signified detachment of the choroid. The phenomenon observed was difficult to describe. A mesh-work of blood-vessels—manifestly those of the choroid—were thrown into view in a fashion as if one saw it in water. He was not undeceived as to the nature of the condition being choroidal separation, but retinal separation instead, until after watching two or three cases when the effused fluid began to undergo absorption. He was not, however, likely to commit the mistake again.

DR. KNAPP, of New York, was perfectly familiar with the phenomenon mentioned by the president. It was almost a constant phenomenon of incipient detachment of the retina. The image unto which he would liken it was the rippling of water. It varied somewhat in appearance with a change in the position of the mirror. He had mentioned the condition incidentally some years ago, and was surprised that it was not spoken of oftener.

THE PRESIDENT remarked that he had likened the appearance to that of a lot of red worms in a box. It was not of rare occurrence, and simply indicated transparent fluid overlying the choroid.

A PECULIAR CASE OF ALOPECIA OF THE EYELIDS.

(PLATE—FIGS. 1, 2, 3, 4, 5.)

BY F. BULLER, M.D.,
MONTREAL, CAN.

THE microscopic specimens, and the drawings made from them, to which I would call your attention are eyelashes taken from the upper eyelids of a young lady seventeen years of age, who states that for about eighteen months she has noticed something wrong with her eyelashes—that they were falling out from the upper eyelids. For some months the disfigurements from this cause has been quite conspicuous.

She is of somewhat delicate appearance, but enjoys very good health, lives in a healthy locality in the city of Montreal, and her parents are in good circumstances. No other member of the family has ever been affected in the same way. In every other respect the eyes are perfectly normal. The disease is confined to the upper eyelids, the lower lids being provided with a strong growth of healthy lashes.

The edges of the upper lids are neither reddened nor thickened, nor is there any desquamation about the roots of the lashes. She experiences no discomfort, not even itching of the eyelids, and only comes on account of the disfigurement caused by the wasting of the eyelashes.

The left eyelid was first affected, and is the worst of the two, its outer half being almost completely bald; the inner portion has lost fully half its lashes, and those remaining are for the most part small and thin. Some of them, however, are quite short, thick, and dark in color. They are easily pulled out, and she scarcely feels it when they are extracted with forceps, though the extraction of the lower lashes causes the usual amount of discomfort. Most of the lashes, when removed, are seen to have thick, black, knob-like roots.

The right upper lid seems to be provided with about half the normal amount of eyelash. On rubbing the finger along the row, several of the larger lashes appeared to break off on a level with the

skin, and tapered abruptly at the root-end. The others, when pulled out, were similar in every respect to those of the left lid.

Examined under the microscope, the appearance of the eyelashes is striking and peculiar. There are three distinct classes of lashes.

First.—Normal hairs, with normal axis cylinders, the roots and root-bulbs being pale and almost colorless, the root-sheath adherent.

Second.—Dark hairs, thicker toward the root, with interrupted or defective axis cylinders, and in place of a bulb, having a thin spindle-shaped or tapering root.

Third.—Black hairs, with defective or no axis cylinders, large roots and root-bulbs, which are heavily loaded with dark, granular pigment. Most of these are bent like a walking-stick at the junction of the bulb with the shaft, and often peculiarly twisted as if a half turn had been given to the hair at this part.

It will thus be seen that the diseased hairs present opposite conditions as regards the hair-bulbs. In one case there is atrophy, in the other hypertrophy.

The apparent atrophy may be due to absorption of the bulb, or to a softening of its peripheral portions, so that in making the extraction only the central portion of the bulb comes away. The root-sheath of the diseased lashes does not in any case come away with the hair.

The peculiar feature, however, common to both classes of diseased hairs, is the presence of a thread-like material wound around the hair, extending from the bulb to a certain distance up the shaft, but never, so far as I can discover, beyond the point of emergence of the hair from its follicle.

Around the shaft the appearance may be compared to that of a piece of whip-cord loosely woven and knotted, around a walking stick. This simile has been suggested by the bent condition of the hair, in many instances just at the junction of the bulb with the shaft.

In some, as may be seen in Figures 2 and 5, the network apparently commences by several turns of the cord bound tightly around the hair at this part—that is, about the point of junction between bulb and shaft—and one might readily believe this constriction to have something to do with the bending of the hair were it not for the fact that some abnormal hairs are met with bent in a precisely similar manner, but without a trace of the cord-like material around them.

On the other hand, the peculiar arrangement of the network around the shaft of the hair, as well as its appearance when seen in profile at the edge of the hair, raises the question whether it may

Fig. 1. 2. 3.

1

2

3

Normal hair with adherent root-sheath.

Fig. 4. 5.

4.

5.

W. RAPHAEL
1882

not be a mere exaggeration of the normal imbrication of the epithelial structure of the hair at this part (see Fig. 3); indeed, it is not difficult to conceive how a series of epithelial cells, flattened as these, might, by being curled up at their free edges, give rise to an appearance similar to what we here see in so many of the diseased hairs. But this explanation would fail to account for what we see so plainly in Figures 4 and 5.

The network begins in such a way and at such a point that the explanation suggested is out of the question.

The material composing this network is characterized by its indifference to the chemical action of acids and alkalies. Caustic potash in strong solution at most causes it to swell a little, but does not materially alter its appearance.

I have not as yet been able to satisfy myself as to its real nature, but from a clinical standpoint I should say we have to deal with some sort of parasitic growth; if, however, this thread-like structure is actually a fungous growth, it differs very widely from any species of tricophyton hitherto described.

Neither have I succeeded in finding anything I could recognize as fungus spores or conidia, and for this reason, if for none other, I hesitate to place the morbid condition of the eyelashes in the category of parasitic diseases of the hair. Its non-infectious character may be inferred from the complete immunity thus far shown by the lower eyelids. In default of any successful experiments in the cultivation of the fungus—if it be such—the precise nature of the disease must remain a matter of uncertainty.

Since the case has been under my observation, the only treatment employed has been thorough epilation as fast as the growing lashes would admit of removal, and painting the edges of the lids with tincture of iodine. So far the result is entirely negative, recently grown cilia showing exactly the same characters as their predecessors.

REMARKS.

DR. HASKET DERBY, of Boston, asked Dr. Buller whether he had used pilocarpin by subcutaneous injection in any cases of alopecia of the eyelids. It was reported to cause growth of hair to take place on bald places of the scalp and to prevent the hair of the scalp from turning gray.

REMOVAL OF FOREIGN BODIES FROM THE CORNEA.

BY HENRY D. NOYES, M.D.,
NEW YORK.

I HAVE for two years found great comfort in dealing with foreign bodies in the cornea, when I could not call upon an assistant to hold the lens for focal illumination, by having the lens attached to the forefinger of my left hand, in a manner which I described in a treatise on diseases of the eye, published in 1881, page 213. With the same finger I hold the upper lid, and with the middle finger at once depress the lower lid and steady the eyeball. The illumination once obtained remains undisturbed. I have also been able to hold a second lens in the same hand to be used as a magnifier, to bring the foreign body distinctly to view, and to facilitate its removal. I have had made a duplex lens consisting of two plano convex lenses, set in a ring with their convex sides toward each other, and projecting from the ring is a stem about 4 ctm. long, which is run through a cork 1 ctm. in diameter and 2 ctm. long. The lenses have a joint focus of 2½ inches (6.3 ctm.). The cork is the handle by which the lens is held between the side of the thumb and the side of the base of the index finger, at the metacarpo-phalangeal joint.

In arranging the two lenses in place, the upper lid is pushed back by the tip of the index finger, the lens for focal illumination is set at the proper angle and distance from the cornea, the eye being turned slightly away from the window, and when this is well adjusted and the eye brought to a quiescent attitude, the lens for observation is set between the thumb and the first phalanx of the index finger, and put into the position requisite for giving a full view of the foreign body. This is done by the other hand at first, but the thumb can make small movements of adjustment by rotating the cork-handle. I was surprised to find that so much command could be gained over the observing lens by this unusual and seemingly awkward style of prehension. The illuminating lens should be larger than the other, viz., 4.5 ctm. in diameter, and the latter need not be more than 3.5 ctm. in diameter. With a little practice

one soon finds it easy to use a needle under the lens, and in the case of minute foreign bodies, their removal is more quickly and certainly effected than by the unaided eye.

The observing lens being of two and a half inches focus, and the operator's eye being distant from it, say ten inches, a much greater magnifying power is obtained than could be had by any available spectacles worn on the operator's face. In many cases no such aid is needed, or spectacles would be preferred, but in certain instances the proposed arrangement is highly convenient. (I may say in parenthesis, that should spectacles be worn the best are prismatic convex, which Brücke first suggested, with focus of ten inches and abductive prisms of 12°.) In all cases it is valuable in giving one assurance that all of the foreign substance has been removed.

I venture to add to the above communication an account of two cases, which called for unusual proceedings. The first was a child who, while looking up into a chestnut tree, had a "burr," or the spiny husk of the fruit, fall upon his eye. Ten days afterward he was brought to me. I found five of the spines sticking perpendicularly into the middle of the cornea. They had been stiff, but were now softened, and around each a little ulceration had occurred. Some had been broken off, while one had passed into the anterior chamber and left a just discernible end upon the outer surface of the cornea. I gave chloroform, and under a good light I was fortunate enough to lift all of the spines out by a pair of forceps which tapered to extremely fine flat points, and had no teeth—they were roughened at the inner surfaces by fine transverse scratches. Such forceps alone were adapted to seize the soft and friable spines which a ruder instrument would have broken off, and which a needle would have pushed into the anterior chamber.

I have elsewhere called attention to the utility of fine straight forceps with projecting teeth, which reach forward, for grasping small bits of metal imbedded so deeply in the cornea that a needle would be liable to push them through. The prehensile capacity of such teeth is far greater than when the teeth are set transversely to the axes of the blades.

The second case to be mentioned is that of a man who, while chipping iron, was struck in the eye by a flying fragment. I found a wound in the cornea about three millimetres long, in which was lodged a bit of metal which did not occupy the whole length of the cut, and whose extremity projected beyond the deep surface of the cornea. The fragment was below the external surface, and offered no

opportunity for seizure by any kind of forceps. The risk of pushing it into the anterior chamber by them was very great. A magnet was tried, but as usual in such cases, it was of no avail. I then resorted to the following plan. Inasmuch as the cut was entirely through the thickness of the cornea, and was larger than the foreign body, I put the point of a sickle-shaped needle into the cut underneath the fragment, and pressed it onward until it had passed well under it, and then with a prying movement I tilted it forward, and at the same time cut upward. The bit of iron was forced out, and some drops of aqueous escaped. The critical feature in the manœuvre was thrusting in the needle, because the wound was opened and the aqueous leaked out, while naturally there was risk of pushing in the piece. I do not regard the removal of a foreign body from the anterior chamber as a formidable undertaking, but it has more gravity than the proceeding described.

REMARKS.

DR. SEELY, of Cincinnati, referred to a similar case, the patient having fallen upon a weed from which many fine spines projected. He was unable to remove the several pieces upon the cornea with the forceps, but had to make an incision the entire length of each, and lift it out of its bed. The boy has perfect sight, and there is no opacity of the cornea.

DR. E. HUTCHINSON, of Utica, N. Y., had twice tilted a small-sized foreign body; in one case a piece of steel out of its bed in the cornea by the means employed by the president; namely, by passing a needle alongside the foreign body in the opening, and tilting it out. In neither case could the body be seen by ordinary focal illumination. In one the ophthalmoscope was necessary to the extraction of the body.

DR. C. J. KIPP, of Newark, N. J., asked whether the piece of steel could not have been extracted in this case by the magnet. He had had a number of cases in which the most powerful electric magnet failed to extract a piece of steel from the eye.

THE PRESIDENT remarked that the magnet was tried in this case.

DR. S. F. MCFARLAND, of Oxford, N. Y., had a case last fall, in which the foreign body penetrated the cornea more centrally, and entirely through its thickness; so that on extracting it a little of the aqueous humor was lost. It was tilted out in the same manner as in the president's case. Several years ago he also had a case, in which a chestnut-burr having fallen upon the eye of a young man, several of the small points remained, and were extracted by the cataract needle.

DR. S. THEOBALD, of Baltimore, saw a patient who, last January, struck his eye on a piece of corn-stalk. At the time he saw him,

which was three or four months later, there was superficial ulceration just at the periphery of the cornea, and on careful examination he discovered and extracted a piece of the stalk about three millimetres in length. It was withdrawn without trouble, and the inflammation subsided within two weeks.

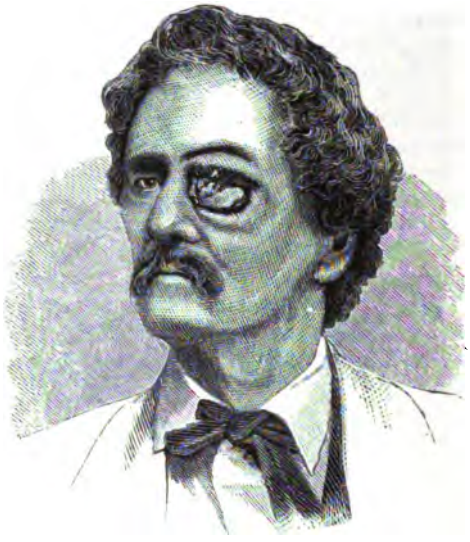
DR. F. BULLER, of Montreal, Canada, thought that in the extraction of foreign bodies from the eye, each case had to be managed according to its own indications. The following case might illustrate his meaning: A lady was passing through the woods, and struck her eye against a thorn. The eye was wounded, but her physician could see no foreign body. About five days later Dr. Buller saw her, and found that the foreign body had penetrated just opposite the lower margin of the pupil, the point of it entering the iris. He thought at first that by making an incision from below, nearly through the corneal tissue, a sharp hook might be passed in and made to drag it out. This did not succeed. He then concluded to make an incision near the margin of the cornea, sufficiently wide to enable him to get hold of the body. This was done; the aqueous humor flowed off; he entered the eye with a pair of forceps, grasped the foreign body, and shoved it back without difficulty through the aperture through which it had entered the eye. The case did well.

THREE CASES OF TUMOR OF THE EYE.

BY HENRY D. NOYES, M.D.,
NEW YORK.

CASE I.—John M. De G., aged fifty-one, born in the United States, painter, consulted me in May, 1881. A year previous, while he was kalsomining a ceiling, a drop of the liquid fell into his left eye. He was not obliged to stop work, but the caustic solution made his eye sore for two weeks, all the irritation being confined to its inner canthus. At this period he noticed a little swelling, which would at times become larger, and then again grow small, but never pass away. Nine months later he was struck in this eye by a lamp when he was parading in a torch-light procession, and thereafter the tumor grew larger rapidly. His condition when I first saw him was as follows: A smooth red mass occupies the palpebral opening, keeping the lids apart and completely concealing the eye; it is 5 ctm. long and $3\frac{1}{2}$ ctm. wide. On pressing aside the lids, it was found to be attached to the conjunctiva of the inner side of the globe, to the caruncle, to the inner half of the lower

lid, and to the periosteum of the inner wall and floor of the orbit. It displaced the globe downward and outward, and overlapped the cornea as far as to the outer canthus. On lifting its outer edge the cornea was found clear, and the patient said that he had good sight. The tumor had never bled; it was smooth, rather firm, and yielded but little secretion. There had not been any pain. The eye was capable of motion, and the tumor participated slightly in its movements. The figure is taken from a photograph. There were no lymphatic glands enlarged; there was very little pain caused by the



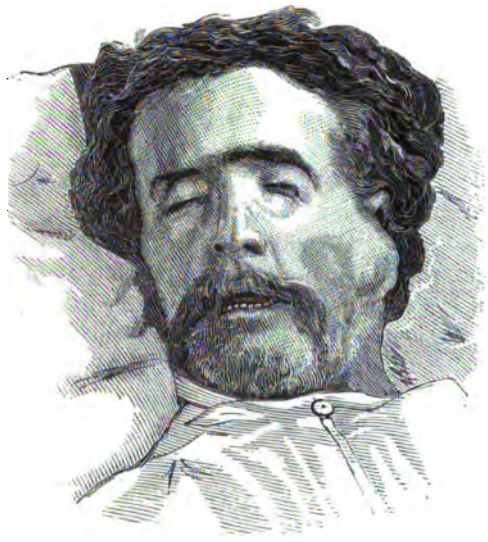
tumor. The patient's health was good, but he was extremely anxious to be relieved, and of very nervous temperament.

I determined to remove the tumor without sacrificing the eye. The patient was etherized, and the excision of the mass accomplished by a pair of strong scissors curved on the flat, whose cutting edges were used sparingly, while most of the work was done by tearing with closed blades. A deep hole was made at the inner side of the orbit, and the inner half of both the upper and lower lids was taken away. It was not necessary to remove any skin from the side of the nose. The wound was of formidable depth and extent, but was completely covered by a flap brought down from the middle of the forehead. It was found that the flap was larger than was necessary, because the removal of the tumor permitted the outer

part of the lower lid to return nearly to its proper place. As much as was thought suitable was rejected, and the parts carefully united by pins and sutures.

Healing took place without complication or accident, and the patient was dismissed on the fifteenth day. The cornea was not injured, and sight was good.

During the summer the parts remained well, and there was no sign of recurrence of the disease. In September, three and one-half months after the operation, a swelling appeared in front of the left



ear supposed to be the enlarged pre-auricular lymphatic gland. This increased in size until it became as large as a walnut. The patient was urged to submit to its removal. He delayed compliance until he was brought in a carriage to the Eye and Ear Infirmary, on October 27th, in a state of great prostration. He was in a profoundly cachectic condition. His skin was sallow, he was much emaciated, he easily vomited, his appetite poor, he was unable to sit up; pulse about 100, and weak. The pre-auricular tumor had nearly doubled in size, and another had appeared under the ear; they soon coalesced. The patient was anxious to have them removed, but his condition forbade it. He grew daily more feeble, and when the photograph, reproduced here, was taken, he was hardly able to bear the fatigue of being propped up in bed. The

picture shows the situation of the secondary tumors and the appearance of the flap. There was no evidence of return of the disease in its original situation, nor was the eye impaired, but at the upper end of the cicatrix in the forehead there was an ulceration of the skin. He died from exhaustion on November 18, 1881.

Autopsy, twenty-two hours after death, made by Drs. Oppenheimer and Orr. Rigor mortis present; body emaciated; face pinched; over the left parotid and in front of the ear a tumor the size of a small hen's egg. Scars of the operation described above. At the upper end of the scar, on the median line of the forehead, is a flattened nodule, the size of a nickel five-cent piece (about twenty millimetres in diameter). There is a similar one over the parietal bone of the left side, and one at the vertex. All these, except that on the parietal, are found to penetrate the bone, and this is found to be necrosed. The first one mentioned, viz., that on the forehead, perforates the whole thickness of the bone, and on the inner surface of the skull a small nodule was found adherent to the dura. The nodule over the parietal bone adhered to the periosteum. Over the centre of the sternum was a deep perforating point of necrosis. The right lung was firmly adherent to the chest over its whole extent by old pleuritic adhesions. Both lungs were œdematous; several firm nodules existed in their lower lobes. The heart fatty, ventricles thin; a well-organized clot was in the right auricle. The liver was normal, except some spots of fatty degeneration. Kidneys normal; there were three well-marked nodules in the pancreas. The eleventh rib of the left side was extensively necrosed and surrounded by a large mass of cancerous deposit. In the skull the dura mater was firmly adherent in the line of the longitudinal fissure. The arachnoid and pia greatly congested over the convexity. The brain tissue rather anæmic. There was a small black nodule at about the middle of the first convolution of the left side. The sphenoid bone at the sella turcica was necrosed and a dark nodule, the size of a chestnut, occupied the diseased spot. The optic commissure overlying this was discolored and seemed to be implicated. The right optic track was softened. The tumor below and in front of the ear consisted of the parotid and the pre- and sub-auricular lymphatic glands, fused together by supposed cancerous deposit. It dipped down beneath the posterior margin of the masseter muscle to the periosteum of the inferior maxilla and to the pterygoid process. It was adherent to the sheath of the carotid vessels; the temporal artery passed through its upper portion. The flap at the inner part

of the eye appeared healthy and no breaking down of its tissue could be discovered.

Microscopic examination made by Dr. James L. Minor. The specimens had been preserved in Müller's fluid and thence transferred to alcohol. The microscopic appearance presented by all of the specimens is so similar that a description of one will answer for all; and it will be necessary to point out only a few peculiarities belonging to several of them. The primary growth is of a mixed structure. By far the larger part of the tumor is composed of fusiform nucleated cells, running parallel with each other, either with or without a scanty supply of an irregularly arranged connective tissue framework, while in other localities there is a perfect alveolar arrangement of the connective tissue, the meshes of which are filled with nucleated cells of various shapes and of different sizes—most of them round, others oval, and some spindle-shaped. The whole mass contains many blood-vessels; and there are numerous hemorrhages in its substance. Dark brown pigment granules are observed, which are usually arranged in clusters in the neighborhood of a blood-vessel. The secondary growths in the cheek, scalp, dura mater, optic nerve, cortex of brain, lung, and pancreas present appearances similar to those just enumerated, with this difference, that there is a greater preponderance of the cellular elements over the alveolar framework, and a larger supply of pigment granules. The spots of softening and disappearance of bone in the skull, sternum, and rib are composed of round and spindle cells, with hemorrhages and pigment granules, without an alveolar framework. In attempting to classify this neoplasm, its dual character is at once recognized, and the term sarcoma-carcinomatoides describes the appearances so well that it may be advantageously applied, though the growth probably belongs to the sarcomata, being a spindle-cell melanotic sarcoma. The alveolar connective tissue framework, which would place it with the carcinomata, evidently occupied a subordinate position, and must give place to the cells, which places it with the sarcomas.

In a paper contained in the *Archives of Ophthalmology*, edited by Drs. Knapp and Hirschberg, for July, 1879, Vol. VIII., No. 2, p. 145, I reported a case of melanotic epithelioma of the surface of the eye, which was removed, and up to this time has not recurred. I gathered the statistics of extraocular neoplasms with a view of determining in what proportion they might prove to be of purely local char-

acter, and how frequently they would be found to be part of a constitutional malady. This involved also the question, how often after the removal of such a tumor the eyeball might be preserved. I collected 127 cases. In all an operation was performed. In 36 the ultimate issue was not stated. Out of 91 cases there were 20 in which a period of exemption varying from six months to seven years was observed. It was also found that some tumors which did recur, and were again extirpated, in some instances more than once, finally ceased to reappear, and the eye was permanently saved. In other recurring tumors which ultimately entailed the loss of the eye, the organ was saved for periods varying between one and eleven years.

The conclusion warranted by these researches is that an effort to save the eye is always justifiable, when its integrity has not been compromised. I think the case which has just been narrated strengthens this inference, notwithstanding the ultimate taint of the constitution. There was no return of the disease in the place where it at first broke out, and during the period of his survival the patient enjoyed the use of his eye. While the first visible recurrence of the disease was in the neighboring lymphatic glands, it cannot be affirmed that this was the first spot to be attacked by a relapse, because the pancreas was extensively invaded, and likewise remote parts of the body tissues. The disease was completely removed from the place where it at first took root, and the subsequent return was to be ascribed to the constitutional dyscrasia.

CASE II.—*Epithelial Cancer of Ocular Conjunctiva—Removal—No Recurrence after Two Years.*—Mr. H. A,. aged seventy-one, merchant, Greenwich, Ct., on June 8, 1880, consulted me respecting his left eye. Three months before the eye felt as if it had been pricked. Three weeks later a film came over it, and a week after this a fleshy growth was noticed on the temporal side of the limbus. After this the eye became red, and remained inflamed for some weeks. Has had no pain, but a feeling of soreness. The growth is in the ocular conjunctiva, on the temporal edge of the cornea, and is of the following dimensions: transverse, 7.5 mm.; vertical, 5 mm. It is white, with a pinkish tinge, smooth, as if covered with epithelium, and many large vessels in the sclera converge to it. The cornea is clear and vision good.

June 9th, the growth was thoroughly removed by scissors, and the edges of the conjunctiva brought together with sutures. That part encroaching on the cornea was also removed. The microscopic

examination showed the growth to be epitheliomatous. Epithelial nests, epithelial pearls, and irregularly distributed cells, with scanty connective tissue were noticeable. The wound healed kindly, and the patient was dismissed on June 12th, cured. He was seen at intervals of about six months, and the last time in December, 1882, when the parts were perfectly healthy, and the eye normal.

CASE III.—The following case of choroidal tumor, although pathol logically not rare, possesses in its symptoms and history clinica-features which make it interesting:

Mr. William P., born in Scotland, and living in Ohio, aged fifty-six, came to me at the New York Eye and Ear Infirmary on May 12, 1882. He was robust, and in good health. He stated that about a year previous his left eye became dim, without apparent cause, and he determined to go to Scotland for advice. He placed himself under the care of a surgeon of Glasgow, who told him he had subretinal effusion. He was treated for this lesion, and also treated for suspected or declared sympathetic trouble in the opposite eye. The sight in the first eye grew worse, and finally almost disappeared. No inflammation took place, and in the early part of April he came to New York. Then acute pain and inflammation attacked the left eye, and after it had continued for some time he came to the Eye and Ear Infirmary.

The situation of the left eye was as follows: The cornea clear; aqueous hazy; iris discolored; no pupillary adhesion; pupil in medium dilation; no reflex to be gotten from the fundus; tension +1 or almost +2. A dull perception of light over the extreme lower part of the field; in other parts no perception at all. On this history and these symptoms I founded the diagnosis of almost total subretinal effusion, accompanied by intraocular tumor. The history of the case, and the character of the visual field, furnished the diagnosis of the subretinal effusion. The recent attack of inflammation, to which the obscurity of the fundus was to be ascribed, and the increased tension, led to the belief in the coexistence of an intraocular tumor. As is well known, eyes with subretinal effusion usually have diminished tension when the disease is idiopathic. Furthermore, an acute attack of inflammation, with serous effusion supervening upon retinal separation, calls for an unusual cause to explain it. I call to mind three cases in which I have seen the concurrence of the above group of symptoms depending upon the assumed conditions.

The other eye exhibited no abnormal signs, but its sight was very bad; the record does not state its acuity. The field was perfect. By the ophthalmoscope the media were found clear and the nerve extremely congested. At first sight the idea of neuritis was suggested, but careful inspection with the proper glasses disclosed that there was a high degree of compound hyperopic astigmatism. Instantly, a clue seemed to be offered to some of the peculiarities of the case. The man found, when his left eye was impaired, that he could see very badly with the one remaining. In Glasgow, he was treated for sympathetic trouble of the fellow-eye—and he had in this eye, as stated to me in a letter from the Scotch surgeon, "spectra and other subjective symptoms of an anomalous character, followed by well-marked engorgement of the disk. Under treatment, the eye slowly recovered, leaving the optic nerve somewhat congested. During the whole time he was under observation there was no external inflammation, and no increase of tension in either eye. From the appearance of the right optic nerve, and the peculiar mental state of the patient, I supposed that there was some intracranial mischief, probably tumor of the brain."

This letter was received after the patient had gone from my observation. It is true that the patient was much excited and distressed at the situation in which I found him, but there were no brain symptoms. Vision of the right eye was brought to $\frac{20}{xxx}$ by $+24_s \bigcirc +9_c$ 90°; and when this combination was placed behind the ophthalmoscope (to my instrument the cylindric glasses of the spectacle-box can be fitted by a spring clip) the hazy look of the disc vanished; there was no swelling of the nerve; it was congested, and had the dim look which is its characteristic in many eyes with congenital refractive errors of a high degree.

I felt confident that this eye was not suffering from sympathetic trouble; I at once proposed enucleation of the other eye, because of what I believed to be the cause of its inflammation. The next day the operation was performed. The eye was opened by a section on the vertical meridian. The diagnosis was verified in both its parts. A tumor about 9 mm. in diameter was found springing from the ciliary region in the upper part of the vertical meridian, and there was total detachment of the retina.

Subsequent examination showed the tumor to be a sarcoma.

A few days after the operation the patient was provided with the above-mentioned spherico-cylindric glass for constant wear, and with $+8_s \bigcirc +9_c$ 90° for reading.

All his unpleasant symptoms disappeared, and he went to Ohio.

That a high degree of refractive error, *e.g.*, hyperopic astigmatism, can be misinterpreted for optic neuritis, and be regarded as the evidence also of a sympathetic affection, I have had occasion to know. The mistake was rendered easy because one eye had sustained a destructive injury, and the surgeon, who was a most competent oculist, was anticipating such an issue.

Acute secondary glaucomatous inflammation supervening upon sub-retinal effusion is certainly to be regarded as indicating either an intraocular tumor, or an intraocular hemorrhage—in the majority of cases.

REMARKS.

DR. BULLER, of Montreal, referred to a case in which he enucleated the eye for a malignant tumor, and afterward applied chloride of zinc paste within the orbit, in case some of the remaining tissues might be affected. The patient afterward had symptoms of meningitis, but entirely recovered. An interesting fact was that there should be meningitis without any necrosis of the bones intervening between the eyeball and meninges.

DR. PROUT, of Brooklyn, N.Y., referred to a case in which he used chloride of zinc after removing the entire contents of the orbit. There was almost no suppuration, and the cavity was very slow in filling up. He had had another very similar case. He had had no other trouble from its use, and thought, from his experience in these and other cases, that it tends to lessen suppuration very decidedly. It may be equally well applied to wounds of the soft tissues, and seems to hasten union and prevent inflammatory reaction by its local antiseptic action. He first saw this use of the chloride of zinc advocated by Mr. Campbell De Morgan in *The British and Foreign Medico-Chirurgical Review*, January, 1866, page 201; it is also quoted in *The American Journal of the Medical Sciences*, April, 1866, page 532.

CONTRIBUTION TO THE CLINICAL HISTORY OF METASTATIC IRIDO-CHOROIDITIS.

BY H. KNAPP, M.D.,
NEW YORK.

MR. PRESIDENT AND GENTLEMEN: The interest of the short communication which I beg to read before the society lies chiefly in the observation of the case of a young lady who, by exposure during menstruation, contracted in the lower part of the abdomen an inflammation, which was followed by transient internal ophthalmia in one eye, and purulent irido-choroiditis, with destruction of the globe, in the other. The clinical history is as follows:

Miss Amelia Q., eighteen years old, of New York City, consulted me April 20, 1881. She was employed as a milliner in one of the high Broadway stores, in which, three weeks previous to her coming to me, the staircase door had been taken out on account of alterations being made in the building. Her business required frequent going up and down stairs, and, the weather being very cold and windy, she was for a week greatly exposed to the draught. At the same time her menstruation had set in, which, with her, commonly lasts a week, and is very profuse. On the seventh day she experienced spasms and great pain in the lower part of the abdomen. The next day she had chills, and became so ill that she was obliged to lie in bed for ten days. Her hypogastrium was swollen and very tender. On the advice of her physician she poulticed it, and felt relieved.

On the second day of the attack her left eyeball became blood-shot, but was free from pain, and she was not aware of any impairment of sight. The next day the eye improved, and on the third day it was well again. On the second day, however, inflammation appeared in the *right* eye, beginning with pain, and redness and swelling of the conjunctiva and lids. The vision was lost in a few days; the lids were greatly swollen, and the globe protruded markedly for about a week, then the inflammation and pain abated. When she presented herself to me I found œdema of the lids and conjunctiva, a ring-shaped opacity in the cornea, the pupil totally, and the anterior chamber partially, occupied by pus, the dark iris

visible only at the periphery, the eyeball tension increased, and sight reduced to faint perception of light.

On April 24th, four days later, I found the inflammation less, the cornea, anterior chamber, and pupil clearer, the tension of the globe diminished, but still perception of light.

On April 30th the pupil was free, and a yellow reflex emanated from the vitreous.

On May 7th the eyeball was smaller, the yellow reflex from the vitreous still present.

On May 31st, almost two months after the inception of the ocular affection, the right eyeball was shrunken, the iris atrophied, the cornea smaller, diffusely hazy and wrinkled, the eye free from pain, totally blind. The other eye normal in sight, in external and ophthalmoscopic appearances. The patient has worn an artificial eye since, and experienced no discomfort in either eye.

That the period of menstruation, though a condition of health, is characterized by general weakness and a greater susceptibility of contracting disease, is well known. The physiological congestion of the uterus and its surroundings may, by exposure, be easily increased to a real inflammation, which, in the case just related, assumed a pyæmic nature, resembling puerperal metritis, and was followed by metastatic irido-choroiditis. This succession of grave pathological conditions is unique in my experience, but it struck me as being quite important. That there may be mild cases of pyæmic irido-choroiditis, which do not lead to destruction of the eye, under the picture of panophthalmitis, is, I think, not sufficiently acknowledged. The affection of the left eye of our patient I am inclined to look upon as having been a mild and transient attack of pyæmic choroiditis. If my memory serves me, anatomical evidence for this opinion is not wanting, and chiefly furnished by the examination of the two eyes of women who died from puerperal fever, the eyes having shown similar initial symptoms, which in the one had more or less disappeared, in the other more developed. It seems to depend upon the extent of the infarction whether the initial morbid changes become regressive as long as they admit of restitution, or whether they are progressive and lead to the destruction of the affected organ. Metastatic choroiditis is considered one of the most destructive eye diseases, and, when fully declared, the eye is certainly doomed; but, under the same etiological conditions, affections of the same kind may occur that widely differ as to

their extent and intensity, and this point should be borne in mind when pyæmic inflammation has destroyed one eye, and the other shows symptoms of the same affection. The great majority of cases of metastatic choroiditis which have come to my notice were consequent upon cerebro-spinal meningitis. The eyes which I have seen affected during or after that disease were, I must confess, almost all totally destroyed, yet the experience of a specialist must, in this respect, differ from that of a general practitioner. The specialist sees only the bad or lost cases, whereas the general practitioner sees them all, mild and grave.

From the descriptions of Niemeyer and others, who have witnessed epidemics of cerebro-spinal meningitis, it is evident that a certain number of cases of irido-choroiditis occurring in the course of that disease, recover with retention of good sight. The blindness from cerebro-spinal meningitis is, however, not invariably, though mostly, the result of purulent irido-choroiditis, but may, as Schirmer has shown, be the result of optic nerve atrophy. I can confirm this statement, and beg to mention a case in which sight was lost in one eye from the former, in the other from the latter affection.

Marx K.'s daughter, aged five years, was brought to me December 12, 1881. She had had cerebro-spinal meningitis in June previous; lost sight in *left* eye during the disease. Two months later had a relapse of the general disease, on the second day of which, she lost the sight in the *right* eye. Has been blind since, but hears well. I found the right eyeball normal in external appearance, pupils not responsive; optic disc white, vessels somewhat smaller. Left eye phthisical, presenting the characteristic picture of purulent choroiditis from cerebro-spinal meningitis. She was seen later, but sight had not returned.

Prognostically, Gentlemen, I would not consider every case of metastatic irido-choroiditis as necessarily leading to blindness, but it may be difficult in the milder cases to establish the *diagnosis* beyond a doubt. If mild pyæmic inflammations occur in many other organs, as is well known, why should they not occur in the eye?

The *treatment* ought to be prophylactic and curative or palliative. The case which forms the basis of this paper is only one example more, after thousands of others, to caution ladies, married or un-

married, not to expose themselves during the period of their menstruation. The same warning should be given to such patients as suffer from diseases which are likely to produce pyæmic inflammations—for instance, suppuration of bones, or of cavities, including the middle ear, the puerperal state, etc. As to the curative treatment I would recommend quinine and the application of cold, which may possibly save an eye, as long as panophthalmitis is not yet declared. I would avoid leeching and depletion in general, as an hydropic condition of the blood seems to favor embolism, thrombosis, transudation, and extravasation.

As soon as panophthalmitis is manifest, palliative measures alone are indicated.

REMARKS.

DR. E. HUTCHINSON, of Utica, N. Y., said that he had seen a case recently, the history of which was that of acute articular rheumatism. During the attack the patient had an iritis, and finally suppurative irido-choroiditis. The young man was brought to him as soon as he was able to travel, and the doctor found the globe soft, the iris adherent, the pupil occluded, and no perception of light. He performed enucleation at once, and found the choroid and retina covered with pus. Another case occurred in a young man who had lumbar abscess, and who finally died of pyæmia. Both eyes were absolutely blind. From the yellowish green reflex, and from other symptoms present, he had beyond question suppurative irido-choroiditis.

THE PRESIDENT remarked, with regard to the effects of cerebro-spinal meningitis upon the eye, that he knew a young man who, from cerebro-spinal meningitis, had total loss of hearing in both ears, and atrophy of one optic nerve, the other eye remaining normal. The explanation of optic nerve atrophy in such cases, he thought, might be the same as that of choroidal disease; it might be an extension of the disease down the sheath of the optic nerve. At any rate, whether or not the two conditions were analogous, atrophy of the optic nerve was one of the sequences of cerebro-spinal meningitis.

DR. MCKAY, of Wilmington, Del., remarked that he reported a case, in which he found most of the conditions described by Dr. Knapp present in the eye of a colored child, which had died of cerebro-spinal meningitis, and the condition of the eye was supposed to be the result of that affection.

A SIMPLE TEST FOR SIMULATED MONOCULAR BLINDNESS.

By G. C. HARLAN, M.D.,
PHILADELPHIA, PA.

THOUGH a great many tests for simulated monocular blindness have been devised, I do not remember to have seen the one used in the case recorded below suggested by any one else. As such cases are sometimes difficult of detection, and occur more frequently than is generally supposed, it is convenient to have a variety of tests at our command, and I perhaps need no excuse for adding a very simple one to the list.

I was recently asked by Dr. Charles K. Mills, a well-known neurologist of Philadelphia, to make an ophthalmoscopic examination in the case of a patient whom he had been called to see in consultation. She was a lady of middle age, previously in good health, of strong will, and active, energetic, and sensible. She had been sick only a few weeks; and, about a week before I saw her, had violent epileptiform convulsions, accompanied with complete insensibility for some hours, and followed by hemianæsthesia of the left side, violent pain in the forehead and occiput, unilateral sweating, partial loss of power in the left limbs, and complete blindness of the left eye. She had complained, some days before, of dimness of vision in this eye. I found her in bed, the object of great anxiety and frequent consultations, and unable to be raised from the pillow for ophthalmoscopic examination. There had been some improvement in vision, and large objects could be indistinctly seen. On testing her for color, with small squares of paper on black ground, she could recognize only the blue, and that with difficulty; but excited my suspicion by stating that there seemed to be two blue spots. Expressing myself satisfied with the examination of that eye, I impressed upon her the importance of deciding if the other were perfect, and my anxiety to determine the smallest letters that she could see through a glass. I then held the three-inch object-glass of the ophthalmoscope before the right eye, and she read No. 3 S., at about 2½ feet, with ease, of course with the left eye. Whether or

not she could have done this consciously, is a point for psychologists to decide. I am inclined to believe that she could not. In either event, she belonged to quite a large class of patients who make excellent subjects for miraculous cures at the shrine of metallo-therapeutics.

Nearly ten years ago, I made use of a similar test, in a case that was reported at the time in the *American Journal of the Medical Sciences*. A girl, eleven years of age, apparently in excellent health, was brought to me by her parents, with the statement, that they had recently discovered her left eye to be quite blind. She had been sent to the family physician, a homœopath, on account of a slight conjunctivitis, and, as the result of the consultation, had returned with this startling announcement. She denied even perception of light in that eye. I failed to detect, or even suspect, the deception; but as a careful ophthalmoscopic examination revealed no imperfection of the organ, I assured the girl's parents that there was no present disease there, and no indication for treatment. The other eye had full vision. Two years afterward she was again brought to my office, complaining that the other eye was failing, the left still continuing stone-blind. She said that the print looked blurred when she attempted to read, and her parents had noticed that she held the book nearer to the eye than usual.

She admitted a vision of $\frac{20}{L}$, and with a 2 D. glass acknowledged to $\frac{20}{XL}$; and when required to read the test letters at varying distances, there were evident discrepancies in her answers. I placed the trial frames before her eyes, with a plain glass in the left side, and a convex one, of ten inches focal distance, in the right. The latter, without exciting her suspicion, excluded the right eye from any distinct vision beyond the focus of the glass; but she still read No. L. at 20 feet as before. Then, having first substituted for the test card another with a different series of letters, I placed an opaque disk in front of the blind eye, and she could not make out a letter. This proved, at least, that she had been reading No. L. at 20 feet with the eye that she pretended was not conscious of the bright glare from the ophthalmoscopic mirror. She did not appear again; but her father called upon me some days afterward, and reported that she had come home in a very bad humor, indignantly accusing me of having treated her with great injustice; but, the next day, had made admissions, which, though partial and constrained, were sufficient to convince him fully of the correctness of my view of the case.

SARCOMA OF THE LACHRYMAL GLAND.

By G. C. HARLAN, M.D.,
PHILADELPHIA, PA.

THE patient was a shoemaker, aged seventy, in excellent general health. He stated that four years before he had noticed a swelling of the upper lid of the right eye. This increased slowly, forcing the eye downward and forward and gradually closing it until, within the last two or three months, he had been unable to expose the ball at all. There had never been the slightest pain or tenderness.

There was a tumor, the size of a hen's egg, occupying the position

of the upper lid and immediately beneath the skin, which could be moved freely over it. The tumor itself was also movable; it had a firm cartilaginous feel and was distinctly lobulated. The eyeball was forced completely out of the orbit, being dislocated forward, downward and outward, and fixed immovably. The top of the equator was below the level of the pupil of the other eye. The accompanying sketches, made by Dr. J. M. Taylor, will give an idea

of the size and form of the tumor, and the position of the ball. The skin of the lids, though very much stretched, was quite loose and entirely covered the ball. There was quantitative vision. A haziness of the media made the fundus indistinct, but it could be seen that

the veins were congested and contorted, and the disc was swollen. There were no glandular enlargements.

A free incision was made over the tumor and a narrow elliptical piece of the skin removed, and the mass, which was without adhesions, was easily turned out with the fingers. The seat of the lachrymal gland was left entirely vacant. A microscopical examination, made by Mr. Geo. Junkin, Jr., of the University Laboratory, showed the growth to be a small spindle-celled sarcoma.

When the eyeball was relieved from pressure it was noticed to be so soft that a suspicion was suggested that the sclerotic had been wounded in the operation. At present, two weeks after the operation, the wound is entirely closed, the intraocular tension is normal, and the eyeball has resumed nearly its natural position, and moves freely in all directions except upward, while even the superior rectus is regaining its power.

Neoplasms of the lachrymal gland are considered rare. The points of special interest in this one are the entire absence of pain throughout the course of the disease, and the outward direction of

the dislocated ball. An inward direction would naturally be expected, and is sometimes included among the diagnostic symptoms. The tumor failed to find room in the position of the lachrymal gland to expand to the large size that it reached, and, therefore, developed toward the inner side of the orbit.

REMARKS.

DR. S. THEOBALD, of Baltimore, mentioned the case of a large tumor, apparently originating in the lachrymal gland, which he saw. The ball was pushed downward, inward, and forward, resting almost upon the nose. It was removed five years ago, and it was believed to be of a sarcomatous nature.

DR. C. J. KIPP, of Newark, N. J., said he had seen a number of tumors which corresponded in gross appearance to those mentioned, but on microscopical examination they were found to be of an adenoid structure, described by Berlin as cylindroma. He believed sarcoma very rarely existed in this locality.

DR. KNAPP remarked that lately he had removed a similar tumor of the lachrymal gland 50 mm. by 40 mm. in size. It was well defined, easily removed, the healing by primary union (no antiseptics), globe returned to its natural position, normally movable, the upper lid movable too. There was optic neuritis (S. $\frac{20}{LXX}$) before the operation, now slowly disappearing. The aspect of the cut surface of the tumor was different from what Dr. Knapp had seen in these tumors; it was homogeneous, purplish-red, consistency of flesh; no amyloid reaction. An immediate cursory examination with the microscope showed a scant amount of connective-tissue fibres, with many small, round, and spindle-shaped cells. No indication of a glandular structure.

DR. KIPP remarked that after removal of the tumors in the cases to which he referred, tears continued to be secreted, and the flow could be increased by stimulation.

DR. HARLAN remarked that a few years ago he assisted to remove a tumor from the orbit, not originating, however, in the lachrymal gland, and it was pronounced to be a spindle-celled sarcoma. It had been growing nearly thirty years.

DR. KNAPP here remarked that the protrusion of the ball outward, instead of inward, in the author's case, was certainly unique, so far as he was informed. He added that, as in the author's case, when he cut the covering of the tumor it presented the appearance of the cut testicle.

A CASE IN WHICH AN ATTACK OF ACUTE INFLAMMATORY GLAUCOMA WAS IMMEDIATELY FOLLOWED BY INFLAMMATION OF THE BRAIN.

By CHARLES J. KIPP, M.D.,
NEWARK, N. J.

Mrs. H., fifty-one years of age, a stout, healthy German woman, came to the Newark Charitable Eye and Ear Infirmary on December 3, 1881, with a letter from Dr. T. Y. Sutphen, of Newark, stating that he had first seen the patient on the day before, and that he found her suffering from acute glaucoma, for which he had prescribed instillations of the sulphate of eserine. From the patient it was learned that the attack began ten days before with great pain in her back, which was followed a few days later by severe headache and sickness of stomach. On the advice of her family physician she applied a fly-blister behind the right ear, and another above the right eye, on November 28th, and within less than half an hour after their application the right eye became red and excessively painful. Since then the sickness of stomach and the pain in the head and eye have continued. Within the last few days the right eye has become blind.

The symptoms presented by the eye when I first saw the patient, were those of acute inflammatory glaucoma; there was, however, greater congestion and chemosis of the entire ocular conjunctiva than I had ever before seen in this disease. The pupil was of medium size—a one per cent. solution of the sulphate of eserine having been frequently instilled during the preceding twenty-four hours. The media were so cloudy that the fundus oculi could not be seen. The eye had perception of light only. Tension +2. The pain in eye and head was almost unbearable.

I immediately put the patient under the influence of ether, and made a tolerably large iridectomy upward with a narrow v. Graefe knife. The operation was perfectly clean, but all efforts to return the corners of the sphincter to their proper position were fruitless, although no iris was apparently remaining between the lips of the wound. During the night following the patient slept soundly, and next morning was entirely free from pain in eye and head, and the tension of the eye was normal. On the third day after the opera

tion she was able to see me distinctly with this eye. The anterior chamber was restored, and the congestion and œdema of the ocular conjunctiva were subsiding. But during this day the left eye became painful and inflamed, and on the morning of the fourth day presented the symptoms of a moderately severe attack of acute glaucoma, which, however, yielded to instillation of the sulphate of eserine in the course of two days, and left the sight of this eye unimpaired. The only feature of this attack worthy of mention was the excessive pale œdema of the ocular conjunctiva which, in some places, was raised in the form of blisters.

Ten days after the iridectomy, the right eye was nearly free from conjunctival injection; the anterior chamber was somewhat shallow; the iris nearly normal; the pupil of medium size, and the media were clear. Tn. The left eye was apparently healthy; the pupil small and fastened by numerous small synechiæ to the anterior capsule. At the urgent request of the patient I allowed her on this day to be taken in a carriage to her home, which was but a short distance from the hospital.

During the following ten days the eyes continued to improve, but on December 25th, twenty days after the iridectomy, the right eye became again very painful, and the sight failed rapidly. At my visit on this day, I found some œdema of the lids, and the ocular conjunctiva intensely injected and very œdematoûs. The cornea was clear, but the iris was discolored and swollen. The pupil and the coloboma were apparently somewhat smaller than before. The vitreous was so full of opacities that the optic disc could not be seen.

The lids of the left eye were also puffy, and the ocular conjunctiva œdematous, but not so much injected as in the right eye. The cornea was dull. The anterior chamber of about normal depth, and the iris somewhat discolored. The pupil was small and excluded. The vitreous was very hazy. This eye was also very painful. Vision was not, so far as I could make out in her own room, greatly impaired. In both eyes the tension was little, if any, above the normal. The patient complained chiefly of the severe pain at the top of her head, and of persistent distressing nausea. Pulse 96. Temperature normal.

In the absence of a marked increase of tension in either eye, I concluded to delay further surgical interference, and ordered applications of ice to the lids of both eyes, and instillations of the sulphate of eserine in the right eye. Morphine was administered for the relief of the pain.

On the following day the pain in the head and the eyes and the nausea continued unabated. The swelling and congestion of the ocular conjunctiva of the left eye had increased. The iris was more swollen and the tension slightly increased. The right eye was unchanged. I now requested that the patient be transferred to the infirmary for the purpose of making an iridectomy on the left eye. Meanwhile instillations of eserine were made in both eyes and the sulphate of quinine was given in considerable doses.

In the afternoon of the next day the patient was brought to the Infirmary. An examination made at this time showed the left eye to be in about the same condition as on the previous day. In the right eye the cicatrix of the iridectomy had become softened, and at both ends a small prolapse of iris was seen under the conjunctiva. Otherwise this eye remained as before. The patient was put under the influence of ether, the prolapsed iris in the right eye was abscised, and a small but clean iridectomy made on the left eye. The abscission of the prolapsed iris caused the evacuation of the anterior chamber. Notwithstanding these procedures, the pain in the eye and the head and the nausea continued.

On the second day after these operations, the swelling and injection of the ocular conjunctiva of the right eye was as great as before; the anterior chamber was not restored; the iris was swollen and the pupil small. In the left eye the ocular conjunctiva was more swollen and injected than before the operation; the anterior chamber was restored; the iris was discolored, and the pupil contracted. The pain in the head and the eyes continued. Atropine was instilled in the left eye.

On the following day the right eye was unchanged. In the left eye the aqueous humor was turbid; otherwise there was no change. Patient was very restless, and complained bitterly of the pain in the head and the eyes.

Next day a fibrinous exudation covered the iris, and a star-shaped mass obstructed the pupil in both eyes. Notwithstanding frequent instillations of a two per cent. solution of atropia in the left eye, the pupil remained very small. Six leeches were applied to each temple, and warm water fomentations were kept steadily on the eyes. The instillations of atropia were continued. Quinine was administered as before, and morphine was given in sufficient quantity to control the pain.

The eyes remained in this condition during the next three days, and then began to mend slowly. The swelling of the ocular con-

junctiva subsided gradually ; the aqueous became clear ; the exudation disappeared from the iris, and the plug in the pupil was changed into a thin membrane. The pupil remained contracted. On the seventh day after the iridectomy on the left eye, the patient raised a considerable quantity of a dark red fluid. During the night she perspired a great deal, and was mildly delirious. No evidence of disease of the lungs or of the heart could be discovered. There was no cough. The temperature was normal and the pulse varied between 90 and 100. The expectoration of the dark fluid continued for two days and then ceased. After this the patient was comparatively free from headache and from pain in the eyes ; but the nausea, the night-sweats, and the mild nocturnal delirium continued. During the day she slept considerably. Her bowels were constipated, and she complained a good deal of dysuria, which was, however, speedily relieved by the free use of flax-seed tea.

On January 7th, eleven days after the iridectomy on the left eye, both eyes became again very painful. The lids of the right eye became œdematous, and the ocular conjunctiva swelled to a greater extent than at any previous time. The corneal cicatrix of the iridectomy re-opened in its entire extent, and the iris was protruded between its lips. The tension of the eyes was greatly diminished. The lids of the left eye became also swollen, and the fleshy chemosis, which had greatly diminished, rapidly attained its former degree. The aqueous was muddy, and the iris much swelled. Tension of this eye was about normal.

The headache was now as severe as ever. In the daytime the patient was in a state of stupor, from which she could be aroused, however, without great difficulty. During the night she was violently delirious. All food was refused. The nausea and the constipation continued. Temperature and pulse were normal. In addition to the medicines previously mentioned, she was now given small doses of calomel. The bowels were moved by castor-oil.

On January 10th the right eye was unchanged. In the left eye the anterior chamber was greatly diminished in depth ; otherwise the eye presented no change. Both eyes were so sensitive to the touch that the patient would cry out if an attempt was made to open the lids. From this time until her departure from the hospital the eyes remained in the state last described. There was but little change in the other symptoms. The patient was in a semi-somnolent condition all day, and frequently moaned pitifully. The night-sweats ceased, but the delirium continued.

On January 14th she became comatose. Passed urine in bed. Obstinate constipation.

On January 16th she had a series of epileptiform convulsions. The coma continued, at times a dark fluid escaped from the mouth when the head was turned to either side. Pulse, 120; temperature, normal.

January 20th.—Since last report the patient has had daily a number of convulsions. The coma continued till this morning. The patient has taken some liquid nourishment and appears to be conscious at times. She has to-day, for the first time, asked for the chamber, and apparently knows her nurses. Most of the time she is asleep. Pulse, 120; skin, cool. Bowels moved to-day for first time for a week. This improvement continued until the night of January 24th, when she became so greatly excited that it required several persons to prevent her from getting out of bed.

January 25th.—Patient was delirious all day. She refused to take food, and spit out all that was put in her mouth. She vomited several times and had a passage from her bowels. In the evening she had another series of epileptiform convulsions.

January 29th.—Since last report the patient has been delirious night and day. Morphia and bromide of potassium were given, but had but little effect. The bowels were again constipated. She took but little food. At times she would ask for the chamber to urinate, and at other times pass her water in the bed. Pulse, 120–130; temperature, normal. Patient was on this day removed from the hospital to her home, where she died February 8th, at 9 A. M.—sixty-seven days after she came under my observation. As regards the symptoms during the last ten days of her life, I know nothing. No autopsy was made.

Remarks.—The case here reported is the only one in which cerebral disease supervened on glaucoma occurring in my practice, and I have been unable to find in the literature accessible to me a report of a case at all resembling the above.

It is well known that an attack of acute glaucoma is sometimes developed in the course of severe inflammatory diseases of other organs, and in fevers, and it seems to me to be not at all improbable that in this case also the cerebral disease existed at the time the glaucoma first manifested itself. The back-ache, the pain in the head, and the distressing nausea which preceded the pain in the eye may as well have been symptoms of the cerebral disease as of the glaucoma, though it must be admitted that this supposition is not

strengthened by the fact that the symptoms enumerated were relieved for some days by the iridectomy. That the brain affection was caused by the glaucoma will not be maintained, I think, by any one familiar with brain diseases. With regard to the very unusual course of the eye affection, I am inclined to think that the numerous posterior synechiæ observed in the left eye after the first attack of glaucoma were the result of the prolonged use of the sulphate of eserine. For the relapse of the glaucoma, after the iridectomy and reopening of the cicatrix, several weeks after the operation, I am unable to assign any other cause than the cerebral disease.

NOTE.—Since the above was written I have read MOOREN'S "Fünf Lustren Ophthalmologischer Wirksamkeit," just published, in which I find it stated that the author has seen four cases of glaucoma which were caused by myelitis. In MOOREN'S opinion the glaucoma resulted in these cases from the irritation to which some of the fibres of the trifacial nerves were subjected at their point of origin. MOOREN states it also as his conviction that a causative relation exists between softening of the brain and glaucoma, and mentions it as a fact that many glaucoma patients are, in later years, attacked by brain disease.

REMARKS.

THE PRESIDENT was satisfied that some such connection between the eye and the cerebral symptom as was mentioned by the author did exist in some cases. He had one case of the kind, in which an attack of acute glaucoma was the initiatory symptom of a brain trouble, which terminated in death. At the autopsy he found softening of the brain with extensive and very severe atheromatous degeneration of the arteries.

EMBOLISM OF THE CENTRAL ARTERY OF THE RETINA.

BY W. F. MITTENDORF, M.D.,
NEW YORK.

THE diagnosis of an embolic process of the central retinal artery by v. Graefe, in 1858, has been justly considered as one of the greatest victories of the genius of this observer, and of the usefulness of the ophthalmoscope. There is but little to add to the graphic description of such attacks as it is given by this illustrious ophthalmologist in the *Archives of Ophthalmology*, Vol. I., p. 136, and I am only encouraged to lay before you the notes of three cases of the kind which have recently come under my observation, partly because the disease is comparatively rare, and also because each of them presents some peculiar features which may be of interest to you.

Two of these cases came to me within a few months of each other. One of them was shown to the members of the New York Ophthalmological Society at the time of the most marked œdematous infiltration of the retina, and the second one has been seen by many of my confrères at different stages of the affection. Fortunately for my patients, the diagnosis had to be based upon the ophthalmological appearances alone, and has not as yet been confirmed by *post-mortem* examination, nor is there any prospect at present that this can be done for a long time to come.

The first case is that of a bright and intelligent lady, a native of the United States, thirty-two years old, married and the mother of several children. She has suffered repeatedly from severe attacks of inflammatory rheumatism, and lost the use of the right arm several years ago (possibly by an embolic process of one of the left cerebral vessels, as there is not the slightest sign of a specific complication). She never had any disease of the eye, and has always enjoyed excellent vision of both eyes, and has used them very much for fine needlework. On October 2, 1881, she was requested by one of her friends to assist her in shopping, and after dressing rapidly and attending to some necessary house-work, which required the lifting of several heavy boxes, and some running up and

down stairs, she left the house in perfect health. After going about ten blocks she was struck by the fact that she could not see as far outward toward the left side as usual, and speaking of this to her lady friend, upon the advice of the latter closed the right eye, when she discovered that the left eye was completely blind; it appeared as though a reddish gray mist had spread over her sight. She returned home and went to bed, hoping that it would pass off, but it did not only not improve, but the shade became darker. She called on me the next day, when both eyes appeared perfectly normal, not the slightest change being visible to the naked eye, but the slightly enlarged pupil of the left eye did not respond to the light-test, nor could she perceive the slightest amount of light. The right eye was slightly hypermetropic, vision and projection was perfect. On ophthalmoscopic examination, the peculiar pallor of the retina was very marked and quite extensive, leaving only the most peripheral part of the retina in its usual color. The optic disc appeared red, and the outline very indistinct, which was due to the swelling of the surrounding retina, the appearance of which was in marked contrast to that of the disc, the latter being decidedly pink, the former almost pale gray and opaque. The vessels, both arteries and veins, appeared very pale and small, but otherwise normal, and it was quite impossible to produce the slightest pulsation of either of them, even by compressing the globe as hard as the patient could bear it; the smaller branches seemed to be hidden under the opaque retina a short distance from the optic disc. The region of the retina around the macula was greatly infiltrated, swollen, and very pale, but the fovea centralis presented the characteristic appearance of a perfectly round cherry-colored spot of the apparent size of the head of a large pin, which, on account of the surrounding pale retina, was rendered all the more brilliant. *There was no perception of light*, but the patient had no disagreeable sensation whatever about the eye.

My diagnosis of embolism of the central artery of the retina being made, and the history of a great number of rheumatic attacks, and that of a paresis of the right arm being elicited, I had her heart examined by Dr. E. S. Warner, who reported that there was moderate hypertrophy with marked regurgitation at the mitral, and slight murmurs in the region of the aortic valve; her pulse was 92, compressible and irregular, and the patient somewhat anæmic. Hoping that, by increasing the power of the heart, I might be able to force the embolus from its location, which I supposed to be in the main artery, into one of the branches, and thus limit the bad results to a

portion of the eye only, I commenced to administer the tincture of digitalis. The patient took five drops of a good and reliable tincture of digitalis three times a day, and at the next visit I was surprised to hear that the upper part of her visual field had so far improved that she could distinguish large objects, such as the hand, for instance, and see the ceiling of the room, but could not distinguish a piece of chalk sufficiently to have the field of vision mapped out carefully. The ophthalmoscopic appearance of the retina was not much changed, but the lower branch of the artery appeared to contain more blood than before, and in the upper one, near the place of the first branching-off vessel, an obstruction could be seen; it resembled a colorless fibrinous mass, but it did not seem to obstruct the artery completely, as a very fine column of blood, resembling a thin red thread, could be seen at the nasal side of the plug; the vessel appeared well filled up to this point, but no circulation could be noticed beyond this point. The following day the upper part of the field of vision was decidedly clearer, and there was slightly less limitation of the field. The apparent embolus had evidently contracted, and had been carried upward to a bifurcation of the main branch, leaving the smaller branch, which it had previously obstructed, free. It was now possible to produce pulsation of the lower and main branch, and the appearance of the lower part of the retina was decidedly improved, having now a decided pinkish hue; but the upper part of the retina remained unchanged. The disc itself was now decidedly hyperæmic, and it evidently derived its blood-supply from a portion of the artery that had never been affected by the embolus. The region of the macula lutea presented still the above-described changes, but the color of the red spot was a little paler, and its outline not so clearly defined.

Her vision at this time was $=\frac{5}{cc}$, and her field of vision is represented in Fig. 1.

The patient was now given the same amount of digitalis and one-fortieth of a grain of strychnia three times a day. The eye began soon to disturb the vision of the good eye, on account of its confusing effect, and the patient had to wear dark glasses, or a patch over the afflicted eye, in order to overcome a dizziness when walking. For the next week the changes were slight, both in the size of the visual field and in the acuity of vision. The optic disc, however, presented now the appearance we are so apt to see in a mild case of optic neuritis. The cherry-colored spot in the region of the macula, and the paleness of the surrounding retina, was, however,

only slightly changed. It was at this stage that the patient was presented to the New York Ophthalmological Society.

Her heart acting perfectly regularly, and the pulse being down to 72 per minute, the treatment was changed now to the administration of strychnia and the use of electricity. Under this treatment the vision of the patient improved, so that it rose to $\frac{20}{cc}$, and has remained the same to this date. The defect of the field of vision improved only slightly (see Fig. 2). The ophthalmoscopic appearance is now, after the gradual disappearance of the œdematous condition of the retina, still decidedly pale in the region of the macula lutea, and the fovea still shows as a marked, but not so intensely colored, red spot, of the same size as when first seen. The appear-

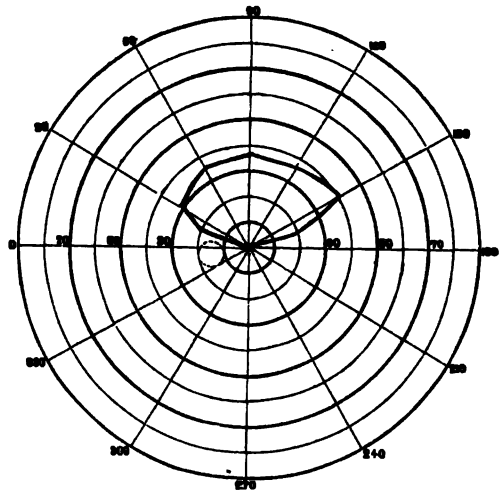


FIG. 1.

ance of the fundus of the good eye is that of a dark, abundantly pigmented one, and the macula presents only the usual picture.

Case II. is that of Mr. S., a literary gentleman, thirty-eight years old, of ordinary size, born in Westminster, Maryland; married; never had sore eyes nor weak sight; his general health had been more or less delicate in early life; he had repeated attacks of malaria, and a very severe attack of acute inflammatory rheumatism in January, 1874, which lasted several months, attacking nearly all parts of the body; but since his recovery from the effects of this attack, in 1875, he has enjoyed perfect health. He has always used tobacco and coffee freely from childhood. On the 24th of Novem-

ber, 1881, he went to business as usual, feeling perfectly well. He had to run and jump to reach the ferry-boat; later he ran up several flights of stairs, and after going into the composing-room attached to his office he felt as if his eyelid had closed on the right eye; in fact, he found that he could not see, except that he could distinguish light at the extreme temporal side, but no objects. I saw the patient within three hours after the attack, and found that the retina was blanched, especially near the macula, and that the fovea showed a well-marked cherry-colored spot, perfectly round, and of the size of the head of a pin, about 2 mm. in diameter by direct examination. All the large vessels of the disk were apparently bloodless,

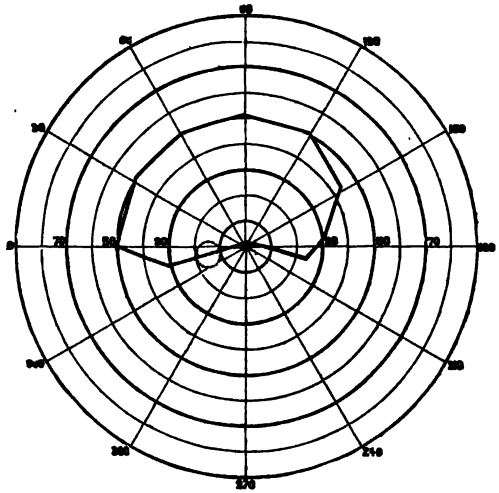


FIG. 2.

and pulsation of either arteries or veins could not be produced, while in the left eye this could be done promptly. His vision was nearly gone, except to distinguish between light and darkness if the light was removed over to the temporal side. His pulse was 102, and quite irregular in beat and force. "The heart is slightly hypertrophied, and murmurs are heard faintly, but distinctly, both over mitral and aortic valve" (Dr. E. S. Warner). The smaller vessels were so much alike in color that it was difficult to distinguish between arteries and veins, and parts of them were apparently bloodless; other portions seemed to contain blood, but no movement of this could ever be seen. The optic disc itself looked gray

and hazy, had a moderately large physiological excavation, and especially the temporal half of its outline was very indistinct; only a few of the smaller nutrient vessels could be seen, and even in these no movement or change of the column of blood could be noticed, which was so marked in Jaeger's case.

My diagnosis of embolism of the central artery of the retina was confirmed by Dr. Derby, who saw the case two days later. The changes in the interior of the eye went rapidly into an atrophic stage. The optic disc, which in the beginning looked hazy, but red in contrast to the blanched retina, became paler every day, and within two weeks the fundus revealed a perfect picture of white atrophy. The arteries became like fine threads and the smaller ones disappeared entirely near the periphery. The veins also became smaller. Quite a number of the peripheral veins underwent degenerative changes, which were followed by numerous fusiform hemorrhages. The case at this stage might have been taken easily for one of *retinitis hemorrhagica*. Thrombosis of these veins was evidently caused by the stagnation of the blood in these vessels. Several of the smaller veins extending almost up to the cherry-colored spot at the fovea centralis, and especially four running downward from above and one from below running up to the macula, presented, with the succeeding hemorrhages, a very unique ophthalmoscopic picture. (Appearances of this kind have been observed by Mauthner and Blessig.) There were evidently also hemorrhagic extravasations in the fovea itself, for the cherry-colored spot became larger, almost of the size of the papilla, darker and more irregular in shape, like Blessig's case, but more distinctly so. Later the hemorrhages gradually disappeared, and also the entire red spot at the macula became absorbed, leaving three or four white dots visible at this point. The retina resumed gradually a more natural aspect, but the nerve remained very white. The larger vessels are still visible, running over the disc, the arteries like two pale red threads, the veins appearing small, but darker; but the smaller branches of the retinal circulation have entirely disappeared. His vision did not come back, but, strange to say, there were two small vessels to be seen at the lower and nasal side of the edge of the papilla, that had not undergone any changes. They are probably ciliary vessels, an artery and its accompanying vein, and are evidently supplying a portion of the retina near the optic disc, and it is this part of the retina that gives the patient some vision at the temporal side. His field of vision corresponds exactly to the location of these vessels. Reaching on

the one side to the blind spot (see map), it extends in the form of a long, narrow ellipse nearly to the periphery; from 20° to 50°. The vision of this portion of the field rose from perception of light shortly after the attack to $\frac{10}{cc}$ at the present time; he can read S. 20 at about 10 inches (see Fig. 3).

The treatment consisted in the administration of digitalis in the beginning, which was continued for several weeks; then as the pulse and the action of the heart improved, strychnia was given, $\frac{1}{35}$ of a grain three times a day, and electricity was used twice a week.

These two cases, although so similar in many respects, differ in other ways very materially. Both occurred in persons that suffered

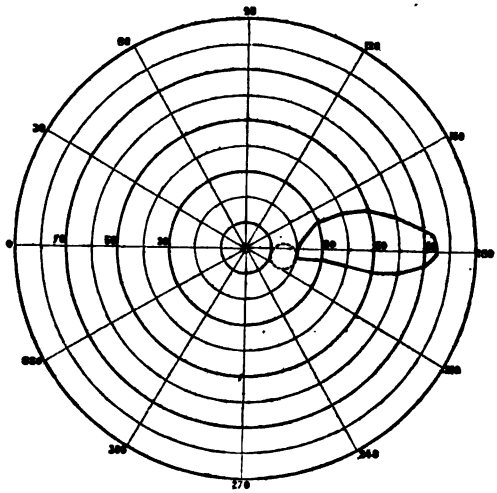


FIG. 3.

previously from inflammatory rheumatism; both had valvular lesions of the heart; they were perfectly well and had no renal trouble at the time of the attack. The onset of the disease was sudden, and occurred after violent exercise in both patients, and the ophthalmoscopic appearance of the fundi was almost alike shortly after the occurrence. But here the similarity ends. In the first case the embolus became dislodged, be it due to the shrinking of the obstructing body or to an increased force in the action of the heart; it entered the upper branch of the artery, where it could be distinctly seen by means of the ophthalmoscope, and on the third day it changed its position again, higher in the artery and near the upper portion of the disc, where it became permanently fixed. The vision of the pa-

tient underwent corresponding changes; from total darkness of the first two days the upper part of the field became clearer and larger until she regained a vision of $\frac{20}{cc}$, and a large portion, in fact, more than the upper half of her peripheral vision.

The second case presents an unusually favorable collateral circulation due to a ciliary vessel, which probably established an anastomosis with the retinal circulation before the attack, but served later to supply a considerable portion of the retina, giving a most valuable amount of sight in the eye, which eventually runs up to $\frac{10}{cc}$.

The embolus, however, is firmly lodged in the main artery, and probably high up. (In A. Sichel's case the embolus was found 5 mm. from the lamina cribrosa.) This would explain why the nutrient vessels of the nerve were early affected, as according to Leber and Schwalbe they are chiefly derived from the central artery, and as a result of it atrophic changes set in very soon, whilst in the first case, where the embolus was near the lamina cribrosa, and later, only in a branch of the artery, the optic disc became hyperæmic from the beginning, resembling almost a neuritis, and appears now, ten months after the attack, quite normal. With the second patient thrombosis of the veins followed the primary attack very soon, and retinal hemorrhages became abundant. In the first case we have nothing of the kind.

The fovea centralis, which in both cases had the usual appearance of a round, red spot, remained in this state up to the present time, many months after the attack, in the first case; but this red spot disappeared soon under hemorrhagic effusions in the second one, and the retina underwent atrophic changes in this region, so that not even the usual redness is visible. In this case we must assume that the choroid became implicated in the atrophic change, or that remains of the hemorrhages, colorless themselves, prevented the reflex of the choroid being seen. In the first case, that of obstruction of a branch of the artery, no atrophic changes of any importance take place, but the disturbance in the retinal circulations affect the choroid sufficiently to keep it in a more or less hyperæmic state, according to Stellwag, which explains the permanency of the cherry-colored spot at the fovea centralis.

The tension of the eyes, both in the first and second case, remained normal all the time, and no glaucomatous symptoms were noticed, which became so prominent in Nettleship's and Loring's cases.

The third case that came under my notice, is that of Mr. G., a German, forty-two years of age, who had suffered from repeated at-

tacks of rheumatism, but never had any serious trouble with his eyes, and had enjoyed good vision up to the time of the present attack. In the latter part of the summer of 1880, one evening, as he was lifting up the heavy shutters of his store windows rather hurriedly, he felt as if something was giving way in his left eye, and on closing the right one found that he was entirely blind in the left eye. As there was no pain or unpleasant sensation in the eye, he went home, hoping that by the next morning he would be able to see again. But he was disappointed in this, and came to me for advice the following afternoon. I found now that the central vision, as well as the nasal half of the field of vision of the left eye was entirely gone, but that he had a large portion of the temporal part of the field left, in which his vision was $= \frac{6}{CC}$. The eye itself appeared perfectly normal. On ophthalmoscopic examination I found the optic papilla slightly congested, hazy, and its outline blurred. The larger vessels of the disc showed hardly any changes, except that they appeared smaller than usual. The temporal half of the retina, especially in the region of the macula lutea, was greatly changed; the œdematous infiltration rendered it almost bluish white. It resembled very much a detached retina, but in the fovea centralis appeared a well-marked, cherry-colored, round spot, of the size usually seen in such affections. No hemorrhages, which I had expected to find, could be seen. Pulsation of the vessels could not be produced; but the seat of the obstruction was not to be found. The arrangement of the two principal branches of the central artery of the retina, however, was peculiar, the upper one supplying almost entirely the upper and temporal and parts of the lower and outer portion of the retina, the lower branch, which was considerably smaller than the upper one, went almost entirely to the lower and inner section of the retina.

Supposing that this was an embolus of the upper branch of the central artery of the retina, I mapped out the field very carefully, and it corresponded exactly with the peculiar distribution of the vessels which I had observed by means of the ophthalmoscope (see Fig. 4).

On examination of the heart, I found distinct mitral regurgitation and great irregularity of action.

Unfortunately the patient never returned, and I know nothing of the subsequent history of the case.

My plan of treatment consisted in the use of heart-tonics, and fearing to stimulate the heart too much by nitrite of amyl, which might possibly have started another embolus, I gave digitalis, and

with excellent results in regard to the heart-symptoms, and probably also in regard to dislodging the embolus. An iridectomy or paracentesis, which have been recommended, seemed to be of such doubtful value that I did not like to resort to them.

Later, I have given strychnia and electricity as nerve-tonics, in order to improve that portion of the retina where the nerve-elements remained in fair condition.

The diagnosis of these cases was made comparatively easy, (1) by the suddenness of the onset of the disease, (2) the great impairment, or even total loss of vision, (3) the history of previous attacks of rheumatism, and (4) the coexisting heart lesions.

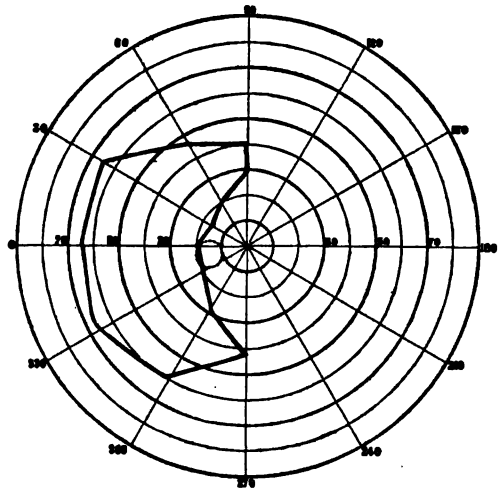


FIG. 4.

It has also been evident that the appearance of the optic disc as well as the prognosis depends upon the location of the obstruction; if this is far up in the main artery, the prognosis is bad, and the optic disc must soon undergo atrophic changes, as, according to Leber and Schwalbe, the nerve receives a good deal of its nutrition from branches of this artery. If the obstruction is near the lamina cribrosa, or in one of the branches, the prognosis is not so bad, and the hyperæmia of the disc, which is apt to follow, may resemble a neuritis.

If these cases had been seen at a later stage for the first time, they would have been very difficult to differentiate from thrombosis

of the retinal veins, retinitis hemorrhagica, or atrophy of the optic nerve, and affections of this kind may occur more frequently than is thought at present. It is also apparent from the nature of the disease, that but little can be expected from the treatment, and that digitalis is perhaps the best remedy at our disposal to improve the action of the heart and the general circulation, thus favoring the establishment of collateral circulation. Pilocarpine has apparently helped to relieve the œdematous condition of the retina, but it has had no effect on the sight in Stellwag's last case. The use of electricity and strychnia, if any function of the retina remains, would recommend itself from general principles.

OPHTHALMIC NOTES.

(1.) DOUBLE GLAUCOMA FULMINANS—(2.) EXTRACTION OF A PIECE OF IRON FROM THE LENS BY MEANS OF THE PERMANENT MAGNET.

BY S. B. ST. JOHN, M.D.,
HARTFORD, CONN.

CASE I.—*Double Glaucoma Fulminans.*—On February 11, 1882, I was sent for to go into the country to see Mrs. L. I found a lady of fifty, who had been ailing for some weeks with dyspeptic and rheumatic symptoms, but was recovering, so as to be about the house. No previous eye trouble had been observed. On the afternoon of the 9th her left eye suddenly felt as if something had gotten into it, but nothing could be seen by her friends, who examined it and remarked upon the enlargement of the pupil. In an hour or two vision became dimmed, and in six hours agonizing pain set in, which was at last quieted by morphine, and did not return except in a very moderate degree. The vision steadily declined. I found conjunctiva chemosed, lids swollen, cornea anæsthetic and hazy, pupil dilated, no reflex from fundus, T. + 2, and V. = perception of fingers at 6″. An iridectomy was at once done under anæsthesia and eserine instilled. Eserine was left with the family physician, to be used in case of an attack in the fellow eye. On the 16th I was called again on account of pain in

the right eye, which I found the counterpart of the left when I first saw her, except that the pupil was not dilated. Pain had set in upon the 12th; eserine had been freely used, and the pain had never been very severe. Iridectomy was done at once. The patient made a good recovery; and May 30th, after correction of refractive errors, o. d. V.=$\frac{1\Delta}{XXX}$, o. s. V.=$\frac{1\Delta}{LXX}$ (with some slight opacity of pupil, due to deposit upon anterior capsule).

I present the case because of the comparative infrequency of glaucoma fulminans, and also because of the short interval elapsing between the two outbreaks of inflammation.

CASE II.—*Extraction of a Piece of Iron from the Lens by means of the Permanent Magnet.*—On January 31st, Michael H., a blacksmith, twenty-two years old, applied to me for relief from an inflammation in his left eye. He said that, three months before, while shoeing an ox, he felt something strike his eye. He had some pain, and vision was considerably impaired, but he did not give it much thought till January 10th, when it became very painful, and had remained so, while the vision of the fellow eye had become impaired also. I found left eye in a state of active iritis, with posterior synechiæ; lens densely white, and at upper part of pupil, and apparently extending behind the margin of the iris, is a rust-colored spot, in which is a black point; T. — 1; eyeball sensitive; V. = perception of light. Right eye slightly tender; photophobia marked; V.=$\frac{1\Delta}{LXX}$. Patient was etherized and incision made as for extraction by Graefe's method. Upon seizing the iris with the iris-forceps in the attempt to pull it out, to make an iridectomy, the traction upon the adhesions ruptured the capsule, and softened lens-matter was extruded into the anterior chamber, carrying the black speck with it. The point of a Gruening magnet was introduced through the incision into the lens mass, and upon withdrawal it was found to have a small fragment of iron adhering to it, not more than double the size of a period-mark in print. The case did very well; the symptoms of sympathetic irritation subsided and vision improved.

I present the case, as illustrating one of the means at our command for dealing with minute fragments of iron or steel when situated in the lens or entangled in the iris, where there is danger that in our efforts to remove them with forceps they may elude our grasp and fall to the bottom of the anterior chamber. I believe the use of the magnet always justifiable where, in cases of traumatic cata-

ract, there is a strong suspicion that a minute fragment of iron is imbedded in the lens, and where it is deemed best to operate for the removal of the opaque lens.

REMARKS.

DR. J. S. PROUT, of Brooklyn, wished to say a word with regard to sclerotomy. He had obtained, by Wecker's method, a very satisfactory result in a case of chronic simple glaucoma that originated in retinitis hemorrhagica. To lessen the difficulty of the operation, which is more delicate and difficult than an ordinary iridectomy, he proposed the following method: To make with a *double-pointed* keratome two incisions at the corneo-scleral margin, between which shall be left a bridge of tissue one-sixteenth inch wide. The incisions are then to be enlarged to the desired extent by means of McDowell's scissors, modified so as to have blunt points, and blades curved to *about* the curve of the corneal margin. By means of these instruments (made for him by Shepard & Dudley) he thought the operation would be an easier one to make than by Wecker's method, and incisions of one-fourth of an inch (=6 mm.) on each side of the central bridge can be obtained without danger.

PREMATURE DELIVERY FOR THE PREVENTION OF BLINDNESS.

BY EDWARD G. LORING, M.D.,

NEW YORK.

So far as I know, and so far as I have been able to inform myself by inquiries among my professional brethren, premature delivery for the sole purpose of preventing blindness has never, up to the present time, been performed, or even advocated.

In suggesting any new remedy, or remedial procedure, especially in so conservative an art as medicine, two things ought to be considered: first, whether there is any necessity for the remedy proposed; and, second, whether the advantages attending its adoption will outweigh the evil effects which exist before the remedy was suggested.

First, as to the necessity of the operation.

It has been long known that pregnant women, especially toward the end of gestation, were liable to suffer from a disturbance of vi-

sion, which might vary from the slightest deterioration to a total and permanent blindness.

Physicians were well aware of this fact long before the true condition of retinitis albuminurica or uræmic amaurosis was known, that is to say, prior to the time of Bright, and long before the invention of the ophthalmoscope.

The fact, therefore, admitted, that possible and under some conditions inevitable blindness may ensue, the question reduces itself to the simple inquiry, whether premature delivery is ever justifiable, either for the restoration or preservation of sight.

It appears to the writer that there are not a few cases in which it is not only justifiable, but where the true principles of sound practice demand its adoption.

The reasons for this belief will perhaps be better explained by the following cases, which are cited simply as useful examples of what may happen, and not infrequently does happen, either directly or indirectly in the experience of every physician and oculist.

The following case is reported by Mr. Robert Lee,[1] the particulars being furnished to him by Mr. Bowman.

On December 7th, Mr. Bowman was consulted by a lady who was pregnant, and "who had rather suddenly lost her sight in great measure." The urine was found to be excessively loaded with albumen. At Mr. Bowman's suggestion the patient consulted Mr. Paget and Dr. West, who anticipated, Mr. Bowman says, as he did himself, "that the confinement would be attended with convulsions of a dangerous character." On January 9th, or one month later, the patient had a premature confinement of a male fœtus, which was still-born. The patient gradually regained her health and strength, but Mr. Bowman regrets to state that the sight has only partially returned.

The first thing which strikes one here is that there was a permanent loss of vision, and the question arises, whether something might not have been done to prevent it. It is stated that on December 7th the patient had rather suddenly lost her sight, and if there ever was a chance of saving it, it was by getting rid of the cause as soon as possible, as it is universally acknowledged by all oculists that the sooner the delivery takes place the better the prognosis for sight. Nothing, however, was done, notwithstanding the fact that the three attending physicians, all men of great eminence,

[1] Medico-Chirurg. Trans., Vol. XLVI., p. 171.

had announced that they anticipated that when the confinement did take place it would be attended with dangerous convulsions, and the woman would have been allowed to remain blind to the end of her term unless nature had stepped in with a premature birth. At any rate, she was allowed to remain blind for an entire month, with the urine loaded with albumen; and what a month's delay, under these circumstances, will, and often does, produce in so delicate a tissue as that of the retina and optic nerves is too well known to need any comment. Would it not have been better practice, nay, was it not the bounden duty of the surgeons in a case in which a great degree of blindness was actually present, and danger to life anticipated, to have produced premature delivery, and not waited for an entire month for the chance intervention of nature, and to have in the end to regret that "the sight had only partially been restored?" Does not the mere fact that the sight did partially return after the patient had lost it in a great measure for a month, show that if the delivery had taken place earlier there would have been every chance of its being fully restored? and is the sight of a woman, in the prime of life, of so little account that no effort should be made, or no risks run, to prevent its loss, especially when it is anticipated that later on there will be danger to her life itself?

The literature for the last half century, as everybody is aware, is full of such cases, and that related above is cited simply for purposes of illustration.

The following case, by Mr. Lawson,[1] is a sad example of the misery which may be entailed upon a patient by recurrent attacks of blindness occurring in successive pregnancies.

B. S., aged forty-one, applied to the hospital on December 2d of this year, suffering from the following amaurotic symptoms. She was the mother of nine children, six of whom were now living. She said that in the second month of her pregnancy with her *eighth* child her sight began to fail her, and continued to get worse until the termination of her pregnancy. She could then only see large objects; she could not count fingers, nor tell a man from a woman; she could merely see that something large was in front of her. After the birth of her child her sight began to improve, but not until after she had begun regularly to suckle it, and in three months' time she was able to read her bible, the print of which was about the size of No. 10 Jaeger, and she could not only see to do needlework, but actually

[1] Ophthal. Hosp. Reports, Vol. IV. p. 65.

did it. In this state she continued for two years, when she again became pregnant with her *ninth* child, and her sight at about the second month again began to fail her, and continued to diminish until at the ninth month she could see no more than she did at the time of her previous confinement. After the birth of this child her sight only slightly improved compared with the improvement which followed the birth of the previous one. This she attributes to the fact of her being unable to suckle her child on account of her bad health. She regained, however, sufficient vision to be able to walk about unguided and to carry her child with her in the streets; and although she could easily distinguish the faces of her friends, still she had not sufficient sight to be able to read or write. Eighteen months has elapsed, and she is now pregnant with her *tenth* child. The increased impairment of vision came on about the second month, as on the two previous occasions, but her sight has failed her this time much more rapidly, and on this account she applied to the hospital.

She is now six months advanced in pregnancy, and the following is the condition of her sight: Right eye—No perception of light, pupil fixed and widely dilated; left eye—is unable to count fingers, but at eight inches can just make out the hand, pupil dilated, but with a very slight range of action.

Examined with the ophthalmoscope, the optic entrance looks small, of a bluish pearly white, the arteries appear like mere threads, while the veins are very large.

She suffers now, and has suffered during her pregnancies with pain at the top and back of her head. The least noise "seems to bewilder her," and she arises in the morning with headache. She has no loss of power in any of her limbs; but looks thin and haggard, having the appearance of one who has gone through much trouble.

A striking feature in this case, and one which is thought to be uncommon, though it is by no means so rare as is supposed, is that the vision began to fail so early in the pregnancy, that is about the second month, and that it occurred in three successive pregnancies at this time. Now, notwithstanding this fact, and that with each pregnancy there was an additional and serious increase in the loss of sight, the patient was allowed to go through three successive pregnancies until she became almost totally blind, without an effort being made to prevent it. No wonder she looked, as the reporter of the case expresses it, "thin and haggard, having the appearance of one who has gone through much trouble." To be blind at forty-one,

with eight or ten children to look after, is not a cheerful prospect for any woman. To be allowed to become so, through a succession of years, would seem, if possible, only to add to the misery. Other cases, precisely similar, might be cited here, as they are familiar to every accoucheur.

Such being the condition of affairs, when matters are left to themselves, it remains to be seen what occurs when interfeernce, either natural or artificial, takes place, and in illustration of this, I would briefly cite another case from Mr. Lee:

On January 29, 1863, Mr. Lee saw a young lady in the third month of her pregnancy. She was suffering at that time from sensitiveness in the region of the uterus, sickness of stomach, and general nervous irritability, the pulse, however, was not very rapid, and there was no symptom to excite alarm. On March 21st, or two months later, he received a note from Mr. Bowman, desiring a consultation, as the patient had consulted him for defective vision. "The urine was loaded with albumen, and there was a destructive disease going on in the coats of the eye." As the patient was in the sixth month of her pregnancy, and as she seemed to be threatened with convulsions, and especially as these symptoms became urgent in the following three days, premature delivery was proposed by Mr. Lee, as he believed the affection of the kidneys and eyes arose from the pregnancy. Before, however, having recourse to this, it was considered proper to have a consultation with Dr. Robert Ferguson, who thought it unadvisable to induce premature labor, "chiefly on the ground, that the life of the child would necessarily be sacrificed, as the pregnancy had not advanced beyond the sixth month." It was determined, in consequence of this opinion, not to interfere, but to wait and see what course the disease would take. On April 10th, or three weeks later, there was an attack of convulsions, and as these were sufficient to excite apprehensions that fatal puerperal convulsions would take place, it was considered proper, after a second consultation, that premature labor should be induced immediately. This was successfully performed, and, with occasional drawbacks, the patient continued to recover for the next ten days, when she could distinctly see the figures on the dial of a watch.

The happy result in this case, and the restoration to vision was, it cannot be denied, due to the premature delivery which was induced, which removed the cause producing the loss of sight, and the only criticism to be made is, that it was not induced as speedily as it should have been, since the operation was delayed until danger-

ous convulsions had already taken place, notwithstanding the fact that precisely this result had been anticipated, and in spite also of the fact that "a destructive disease was going on in the coats of the eye, and that the urine was at the same time loaded with albumen." Neither would it seem that the reason given for the delay, that the life of the child would be sacrificed, was a good and sufficient one, since, from the very nature of the trouble and the condition of the mother, there was every reason to suppose that sooner or later, not only the life of the child was sure to be sacrificed, but also that of the mother would be imperilled. Here too the question narrows itself to whether the possible life of a sickly child ought to outweigh the probable loss of sight in the mother, and whether it is good practice or even justifiable to run such a risk.

A still more instructive case is reported by Brecht, of Berlin.[1]

A woman thirty-six years old, noticed in the third month of her sixth pregnancy a disturbance of her vision. In the fifth month, that is, two months later, she was seen by Dr. Brecht, who detected well-marked organic changes in the retina and optic nerve. The urine was highly albuminous. In October, or three months after the first notice of a loss of vision, eclamptic attacks took place, which lasted twenty-four hours, with a further reduction of vision to such a degree that the patient could not recognize persons in the room. After waiting some days, artificial premature labor was induced by the introduction of a catheter, which was accompanied by further convulsions. On the tenth day after the operation there was a manifest reduction in the quantity of albumen, and vision had improved to a considerable degree. Five weeks after the operation the vision in both eyes had returned to the normal amount (V.=1). A year later some of the ophthalmoscopic appearances still remained, while others had entirely disappeared, but the vision in both eyes was still perfect.

The result here, like that in the former case, is all that could be wished for, but the same question arises, whether it would not have been better, from a clinical point of view, to have performed the operation at the third month, when the loss of vision was first noticed, instead of waiting until the fifth, when convulsions had already set in, and which surely vitiated the prognosis, not only as regards the preservation of sight, but also the life of the mother.

Brecht also reports a marvellous case of separation of both retinas

[1] Graefe's Archiv. für Ophth., B. XVIII., Abth. II., p. 111.

during gestation, and where readjustment of both retinas took place after a premature birth, which occurred without any artificial intervention. Others have reported similar cases, and the restoration of vision after parturition in cases of kidney disease dependent upon gestation, are so common as to need no comment.

In all the foregoing cases it will be noticed that no interference ever took place until the patient had actually been suffering from some grave constitutional disturbance.

The following case differs from those hitherto reported, in the fact that no such disturbance was present at the time of the operation.

E. B., aged thirty-five, consulted me for failing sight. The patient was a married woman, whose general health had always been good, the only departures from which condition were during her pregnancies. She had been married eight years, and had had three confinements in that time. Until within a short time of the birth of her first child she had had no loss of sight. She was, however, highly hypermetropic, and had been compelled on that account to wear glasses, especially for reading and sewing. She had never suffered any pain in her eyes, nor did she at the present time. She consulted me simply on account of failing vision. All other organs and functions seemed to be normal, and a careful examination as to heart, lungs, and kidneys gave no evidence of disease.

Her attention was first attracted to her eyes about two weeks before her confinement with her first child. She first noticed that she could not see people or objects when they were on the left side of the left eye. She stated that the trouble came on rather suddenly about two weeks before her delivery, when she noticed a dimness of vision in this part of the field. This seemed to her like a bright cloud or mist which was replaced in part at a later period by a broad dark band which ran like a stripe across a bright ground. After her confinement the bright ground disappeared, not, however, until her menses reappeared. The dark band, however, remained and no object could be seen when carried beyond a certain distance toward the left.

Just before her second confinement precisely the same thing occurred, and the dark band increased in breadth so much that she could not see objects with the left eye when she looked straight at them, in other words, central vision with this eye had begun to be affected, indeed, was so far gone that it was only by turning her head, so as to bring the objects into the temporal side of the retina, that they could be discerned at all. The "sight of this eye was

nearly all gone" but up to this time that of the right eye had remained unimpaired.

Just before her third confinement precisely the same thing occurred in her right eye, as had taken place with the left, and it was in regard to this that she came to consult me first, in October, 1879. This was three months after her confinement, and her vision began to fail two weeks prior to it. The patient was in much mental distress in regard to the loss of sight and the fear of approaching total blindness, and her bodily health was beginning to be undermined.

The examination of the eyes gave the following result, vision was entirely gone in the left eye with the exception of a quantitative perception of light in a narrow district of the inner field. Vision in the right eye was also so reduced that the patient could not, as she expressed it, tell the faces of her own children. She could barely count fingers at a few feet. In this eye, too, the field of vision was reduced at the outer side, that is to say, the nasal portion of each retina did not functionate.

There was no improvement of vision with glasses. The ophthalmoscope showed that the media were perfectly clear. The optic nerve gave the picture of white atrophy of that peculiar kind in which the capillary circulation seems to have suffered the most. In neither eye were there any capillaries whatever to be seen upon the disk, while the larger vessels seemed to have preserved their normal condition as to size and course. The light streak upon the vessels was well marked and there was no sign of any form of retinitis to be detected. Had it not been for the unmistakable and conspicuous whiteness of the disc, the fundus would have been pronounced normal.

As the case was a loss of vision incident to labor, careful and repeated examinations were made as to the condition of the kidneys, as well as the heart and lungs. No trace of albumen was ever found, nor was there any other departure from a normal standard in any of the other organs.

The treatment consisted at first in the use of injections of strychnia, which were carried to the very verge of toxical effects. Then the changes were rung on the mercurials, iodides, and tonics without the slightest avail, and at the end of a month, vision was no better than at the beginning of the treatment. At the end of this time the menses returned, and from that moment a gradual but decided improvement in sight took place, so that at the end of another month the patient could see with her right eye "to do almost anything." Tested accurately, the vision amounted to one-third of the

normal quantity (V. = $\frac{1}{8}$). There was, too, a reduction in the field of vision, and objects situated at the right of the median line were not as clear as on the nasal side of the field. The patient was, after a little longer interval of surveillance, in order to watch the case, dismissed with a caution to guard against any imprudent use of the eyes, and a most emphatic caution and warning, at the risk of her sight, if not her life, not to become pregnant again.

For the next eighteen months I saw no more of her, when she came to me in great alarm, because she was again "in the family way," and she feared from what I had said, and from her past experience, that if the child was carried to the full term she would become blind, and lose the entire sight of the right eye precisely as she had already lost that of the left. She informed me that she had already communicated the facts of her history, together with the warning I had given her, to her family physician, and at his instigation, she had called upon me to obtain my opinion as to the necessity of a premature delivery. I then made an examination of the eyes, and found that since I had seen the patient, not only had the vision not decreased, but had even improved, it being at the time of the examination, April, 1881, $\frac{2}{3}$ of the normal against $\frac{1}{3}$ of the year before. I could only repeat the warning that I had already given, that is, that at each pregnancy there had and always would be, not only danger to her sight, which in my opinion would inevitably be lost, but also that there was danger to her life. I reiterated that opinion when the family physician called upon me, and that I could see no escape if she was allowed to have another child, if not from death itself, at least from a doom that in my opinion was worse than death, that is, total blindness at an early age, with three or four young children dependent upon her. I was led to this conclusion from the fact that it was absolutely undeniable that the loss of vision was dependent upon the advanced condition of gestation, that the attacks did not come on until just before the time of delivery, and that each attack had been followed by a loss of vision, which had totally destroyed one eye, and had threatened destruction of the other, from which there had been a marvellous, but at the same time only partial recovery, and lastly, because during the past sixteen months, when the menses had been regular and the health restored, the remaining eye had not only not deteriorated, but had even improved in vision.

Premature delivery was produced on May 1st, when the fœtus was three months old. There was considerable reaction after the operation, the patient remaining in delicate health all the summer.

She returned to see me again in November, 1881, when she reported that notwithstanding all the sickness incident to her miscarriage, her vision had certainly become no worse, and she thought a little better; and this was shown to be the case, for the vision had risen to a little better than one-half of the normal amount, against two-fifths at the former examination. The ophthalmoscopic examination showed, however, the same appearances as to paleness of the optic nerve and want of capillary circulation. There was not a capillary to be seen upon the disc.

This is, so far as I know, the first case in which an abortion has been performed where the most prominent, if not the sole symptom, was a loss of vision. It is, however, not the first case in which, in my opinion, it should have been done, and I think if the importance of the matter was better appreciated the necessity for it might appear more frequent than is supposed. I have from time to time been consulted by women who have been confined within a shorter or longer period, and who have told me that they began to complain that their sight was becoming affected before their confinement, and that they had been assured by the attending physician that "it would come all right as soon as the child was born."

That it does come all right in some cases, or what appears to be all right, is often true, but there are many cases in which it not only does not come all right, but in which a deterioration of sight is sustained, which may vary from a slight impairment to an absolute loss of all useful vision. It happens as a common occurrence to the oculist to hear the first complaint in failing sight referred by the mother to about the time she had her first child. White atrophy of the optic nerve is certainly a rarer disease in women than in men, but, according to my own experience, it occurs much more frequently in women who are married than in those who are not, and at a much earlier age. I do not mean to say that in every case where atrophy is detected in a pregnant woman an abortion should be performed, but I do say that where it has occurred in one confinement, every precaution should be taken to explain the dangers of future confinements to the patient, and that in extreme cases, such as the one reported above, premature delivery should be performed rather than let the mother go blind, or run the fearful risk of going blind.

If this is true in regard to the comparatively rare disease of atrophy, it is doubly true in albuminuria, so much more frequently found in pregnant women, and with which we so frequently find the so-called retinitis albuminurica.

Very little attention, even at the present day, I find is paid by the general practitioner to the condition of the urine in pregnant women unless his attention is particularly called to it by some development in the symptoms or some derangement in function.

In the larger medical centres it is true that some very careful physicians do make an examination of the condition of the kidneys from time to time, even if there are no manifestations which make it a necessity; and I have been informed by such careful attendants that if any albumen is detected a strict watch is kept upon the condition of the eyes, and in case any complaint is made of the vision a careful examination is obtained, oftentimes at the hands of an expert, and with an invariable result, no matter how serious the inflammation of the retina may be, and that is, that the only course to pursue is to wait until the child is delivered, with the knowledge that the retinitis will subside as soon as the birth takes place, and with the hope that the delicate nervous elements involved will survive the secondary contraction and atrophy which will follow.

But it often happens that no complaint—not even the slightest—is made by the patient as to her eyes during the entire pregnancy, or at the time of her delivery, and yet a low stage of retinitis, or indeed one of great intensity may exist. Indeed, the vision may remain perfect, or nearly so, for a long time, and only begin to fail long after the active signs of inflammation have passed away and the secondary or atrophic stage sets in.

Thus I have seen women who only began to complain of a loss of sight some four or five months after their confinement, since the subsidence of the first or inflammatory stage had been so slow, and the advance of the secondary or atrophic stage so insidious that the patients themselves have not noticed the gradual loss of vision until they have been considerably affected, which then admonishes them to seek the advice of an oculist. I have certainly seen, if not many, still a goodly number of cases in which the patient herself did not attribute her loss of vision to her confinement but to some ulterior cause, but where, from the ophthalmoscopic appearances, the undoubted evidences of a retinitis albuminurica still existed, and where a close questioning of the patient or her attending physician corroborated the fact that such had existed for a longer or shorter period before the confinement.

It may be, and no doubt will be, urged that the reasons why no interference has taken place hitherto, until the patient was actually suffering from some grave constitutional trouble, which threatened

life, was, that such interference would be unjustifiable, both on moral and legal grounds.

As for the moral aspect of the case, or what in some minds passes for such, I have neither the time nor the inclination to go into so wide a field of discussion. There may be physicians who, as physicians, even unrestrained by legal considerations, might think it right that the highest and most useful of all our senses should be sacrificed rather than that any interference with the workings of nature should take place. From a mere medical standpoint it is hard to conceive of such a thing, and this is all that interests us here.

From a legal point of view it is also hard to conceive that there can be but one opinion, and that is in favor of the operation, when the circumstances are such as demand it. The law states that premature delivery shall not be performed, except for the preservation of the life of the mother or the child; and it is precisely for the "preservation of life" that it would be done, when the eyesight is threatened, for the one is part and parcel of the other, and in operating to save the sight, we are operating to save life. Thus Simpson, many years ago declared, and the opinion is universally upheld at the present day, that symptoms such as headache, giddiness, and derangement of sight, are merely premonitory symptoms of puerperal convulsions; and when these are associated with albumen we may be certain of the liability of our patient to the supervention of convulsions. Moreover, it so happens that these derangements of vision occur at a time, when, as Graefe puts it, "the prognosis for life is even worse than for sight." Given, therefore, a pregnant woman with loss of vision, or organic lesion of the retina or optic nerve, as the prominent, or even as the sole symptom, no one can say that a series of convulsions may not set in at any moment which will carry everything before them, including, not only the life of the child, but also that of the mother.

There is another point of great importance, and that is that where an attack of uræmic or albuminuric amaurosis occurs in one pregnancy, it is almost certain to repeat itself in the following ones, and if the life of the mother has been threatened in the one case, and from which fate there has been a lucky escape, it may also be threatened in the following pregnancies from which there may be no escape.

From the cases which have been reported above, and from the arguments based upon them, I would conclude, first, that examin-

ations as to the condition of the eyes of pregnant women should be made much more frequently than they now are, and that these should be made in a routine manner, even when the patient does not complain of any unusual disturbance, since it has been discovered that about one-third, or thirty-three per cent., of those who have an organic lesion of the retina or optic nerve from kidney trouble either have none or make no complaint of any reduction of vision. This seems almost incredible to the general practitioner; but the ophthalmologist has become only too painfully aware how often and for how long a time eyes may be affected with an inflammatory process of great intensity, and yet give rise to no complaint on the part of the patient.

Thus a retinitis, or a neuro-retinitis, which in its primary stage may exist and often does for months unsuspected by either the patient or physician, may lead, after a long interval, through the secondary or atrophic state to complete blindness.

From the fact that no complaint is made of any loss of sight until near the end of the pregnancy, it has been assumed that the trouble did not begin until that time. I am inclined to think, however, that while this is no doubt true, especially of the cases of uræmic origin, that there are very many cases, especially those dependent on albuminuria, in which the trouble really began long before, and that the eyes, if examined, would often have given evidence of disease, long, oftentimes months, before the explosion took place, which has cost many a mother her eyesight and oftentimes her life; both of which by a timely examination and a timely operation might have been saved. I will even go so far as to say that I believe that evidences of albuminuria not infrequently show themselves in the eye before any manifestations can be had in the urine.

It will be said at once that it is requiring too much of the general practitioner or obstetrician to suppose that he shall acquire the requisite skill to use so difficult and intricate an instrument as the ophthalmoscope. That the ophthalmoscope in its widest sense is one of the most difficult of the instruments used for the detection of disease is, I admit, perfectly true, as it is that few obtain a perfect mastery over it. But the same is true of the microscope—to one great microscopist there are thousands who daily use the instrument with the greatest success in the detection of disease, and it might with a little attention be the same with the ophthalmoscope. Much as I admire the high standard of skill which some of those specially trained to its use naturally acquire, nevertheless I firmly

believe that the sphere of its greatest usefulness, and therefore of its greatest triumphs, will one day be in the hands of the general physician and especially in those of the obstetrician. Thus Mr. Eales reports that a single physician was able to furnish him for examination from a single hospital in Birmingham twenty-eight cases of neuro-retinal disease from kidney trouble in one year, while out of eleven thousand cases of general eye disease at the Eye Infirmary only four such cases were seen.

Secondly, I would conclude that where a marked deterioration of vision had occurred with or without ophthalmoscopic changes, and where blindness is threatened, premature delivery is not only justifiable but often demanded.

Thirdly, when a permanent loss of vision has occurred from a preceding pregnancy, premature delivery in a subsequent one, when surrounded by its proper safeguards, is not only justifiable but at times absolutely necessary; and that, further, when a loss of vision, either temporary or permanent, has once resulted from gestation, it is the duty of the family physician or obstetrician to explain both to the wife and husband that the cause of the trouble is a constitutional and not a local one, and that there is every probability of recurrence of the trouble in succeeding pregnancies, which may lead not only to the destruction of vision but even to loss of life.

CASE OF OSTEOMA OF THE CONJUNCTIVA.

(*With Woodcut.*)

BY EDWARD G. LORING, M.D.,

NEW YORK.

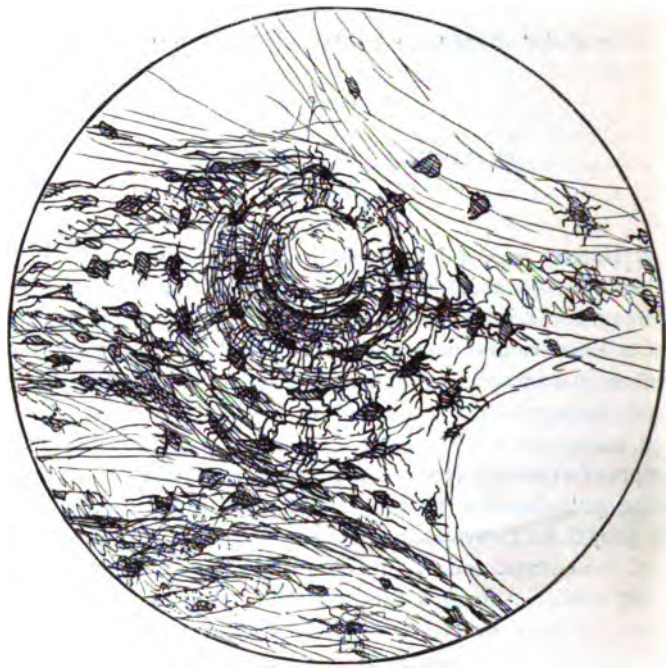
THE patient was a healthy and well-developed child of eight months. Just after its birth, a small fold of "skin," as the mother said, was noticed in the upper and outer angle of the eye. This fold began to be more and more apparent until the child was five months old, when it attained its present position and size, which have not changed during the last three months. The eye has never been at all red except to a trifling degree, and then only at times over the fleshy protuberance. Nor has there been any pain connected with it. The protuberance presented the appearance of a small oval cystic growth, midway between the outer angle of the eye and the edge of the cornea, and was in about the horizontal meridian. It was not until the forceps touched the mass after opening into the fold that its bony or cretaceous character was suspected. It was firmly attached to the conjunctiva above and at the sides, though it did not appear to be attached at all to the globe. The operation healed kindly, there only remaining, at the end of the fourth week, when the child was last seen, a slight injection along the wound.

The other eye was perfectly normal. The child has a slight nævoid-looking spot on each upper lid.

The weight of the mass was 45 milligrammes; length, 8 mm.; width, 5.5 mm.; height, 2.5 mm. It was oval in shape, with the long diameter in the horizontal meridian of the eye. It was convex above and concave below where it rested upon the sclera.

The specimen was given to Dr. W. H. Welch, and his report is as follows: The bony growth is enveloped in a thin fibrous capsule. The growth is found to consist of true bone. Thin slices removed with the scalpel show perfectly formed lacunæ and canaliculi. No large medullary spaces are found, but there are Haversian canals, around which the bone corpuscles are arranged in lamellar systems,

as will be seen from the drawing by Dr. Eno. The addition of acid to a fragment of the specimen causes an evolution of abundant bubbles of gas, leaving behind an organic residue.



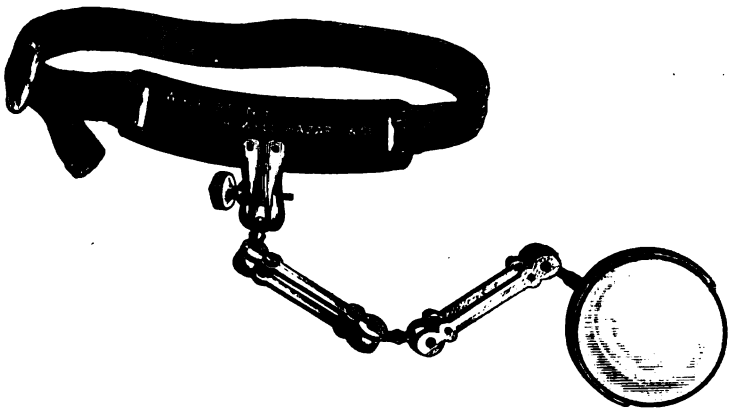
Dr. Welch reports that only two other cases which had been reported are known to him. These are found in Graefe and Saemisch's "Handbuch d. gesammt. Augenheilkunde," Bd. IV., Th. 2, p. 151, 1876. He finds no reference to any cases since then in Virchow and Hirsch's "Jahresbericht."

AN IMPROVED MEANS OF OBLIQUE ILLUMINATION—A CORNEAL CONDENSER.

(With Woodcut.)

BY EDWARD G. LORING, M.D.,
NEW YORK.

SINCE the introduction of the elevated railroads the frequency with which foreign bodies are found impacted in the cornea has increased so much that hardly a day passes that the ophthalmic surgeon is not called upon to remove one or more of these painful and oftentimes dangerous particles. This may occur not only at any hour of the day, but of the night as well, and in this latter case it is



extremely difficult, if not impossible, for the surgeon, without the aid of an assistant, to hold a condensing-lens to accomplish his object. This difficulty has, it is true, been obviated in a great measure by an ingenious contrivance described by Dr. Noyes, which consists of a lens so mounted that it can be worn by means of a spring clamp on the end of the first finger on the left hand of the operator. The amount of movement, however, is small, while to chock the eye

successfully with the index finger so encumbered, and at the same time keep the cornea illuminated, is a difficult operation and requires considerable practice and skill.

Mr. J. E. Adams, of London, described in the *Lancet*, February 7, 1880, a useful and ingenious little instrument, which consists of two lenses attached to a head-band, the plate of which is worn in the centre of the patient's forehead.

The modification of that idea consists, as shown in the drawing, of an arm, broken at the various points by ball-and-socket joints, so as to give a perfectly free adjustment to the lens in any direction, and at any distance up to the extreme length of the arm. This leaves both hands of the surgeon unencumbered, permits the use of fixation forceps if necessary, and does away with the necessity of an assistant to hold the lens.

The arm is attached to an elastic head-band, precisely like the head-band of an aural or laryngoscopical mirror. When in use the band is slipped over the head of the patient in such a way that the hard-rubber support comes at the temporal region and on the side of the eye to be illuminated, the lens then being swung into the position desired. By having the plate at the temporal region instead of in the centre of the forehead, as in Mr. Adams' instrument, and the lamp well at the side instead of directly in front, we get rid of annoying reflections of the lens in the cornea, and avoid the irritating effects of the light from a strong condensing lens thrown directly through the pupil upon patient's retina. If the lens is so arranged as to be a little within or a little without its focal length from the eye, the section of the cone of light is large enough to keep the cornea covered, even if the eye makes considerable excursions, while as the lens is attached to the patient's head, this latter can be moved to a considerable degree without displacing the illumination from the eye. I have found it of great service in operating upon delicate membranes in the pupillary space, as it gives a much steadier illumination, and one which is more easily controlled than when an assistant holds the lens.

By removing the lens from the clip and supplying a mirror, the instrument, from the character of its joints and the mutability of its position, can then be used as a fixed ophthalmoscope for the upright image, and can thus be used in demonstrating the fundus to a class or in making a sketch of it without the observer being compelled to take up and lay aside the instrument at every look; or the upper

half of the ordinary ophthalmoscope can be inserted instead of a simple mirror, and then any optical combination that the refraction of the observed eye may require can be obtained.

I have had a band made which carries two lenses, one on a shorter arm, which is then used as a magnifying lens, but the single one answers every purpose, and for ordinary occasions is the most convenient.

The instrument is also very useful in magnifying small hairs, thus rendering their detection and removal much easier, or in performing any operation at night or whenever the light is poor. When, however, the light is sufficient, and only an increased enlargement is desired, the surgeon, by wearing the band on his own forehead and extending the arm to its utmost, can obtain a large amount of magnifying power, while by slight movements of the head he can successively inspect and keep in front any portion of the anterior surface of the eye or lid.

The instrument can be obtained of W. F. Ford, New York, and A. Keune, New Haven R. R. Building, Franklin Street, New York.

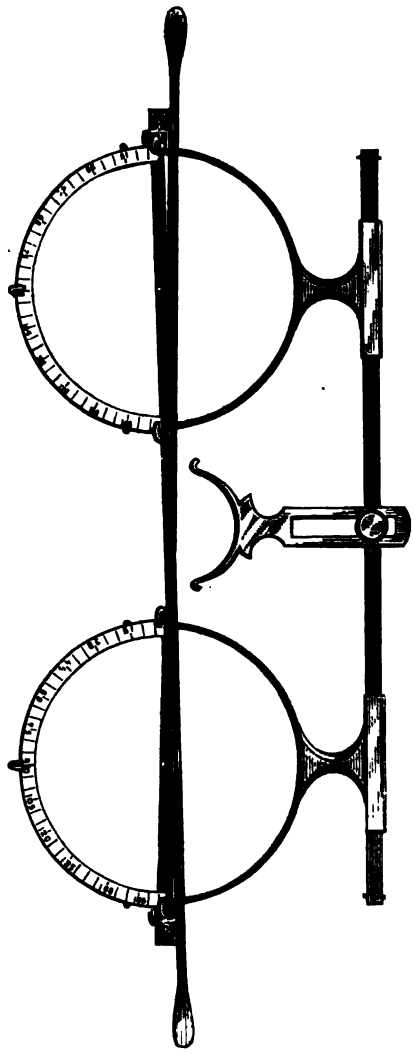
IMPROVED TRIAL FRAMES.

(*With Woodcut.*)

By G. C. HARLAN, M.D.,
PHILADELPHIA, PA.

The convenience of the surgeon and the comfort of the patient depend so much upon the frames used to hold the glasses in testing refraction, that any attempt to contribute to their evolution toward greater perfection may not be considered beneath the attention of the Society. There are some objections to the different forms now in use which I have attempted to eliminate by combining their advantages. Those with the horizontal bar retain the lens with a piece of watch-spring, which is rather precarious in its hold, and is very liable to get out of order; while if the graduated grooved arc is deprived of the support of the bar it must be made undesirably heavy, or is sure to spread after a little use. In these frames the grooved

arc is attached to the lower half of a light ring, the top of which is connected with the bar by a sliding clamp. The groove is adapted



for one glass only, but there are hooks on each side of it wh accommodate two more. The nose-bridge slides up and dow is fixed in any position.

TRANSACTIONS

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OPHTHALMOLOGICAL SOCIETY

Nineteenth Annual Meeting.

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CONTENTS.

PAGE

MEMBERS OF THE SOCIETY 447

MINUTES OF THE NINETEENTH ANNUAL MEETING 451

Influence on the Refraction of Four Years of College Life. Illustrated by the Statistics of the Last Four Classes Graduating from Amherst College. By HASKET DERBY, M.D., Boston, Mass. 456

Some Improvements in Instruments and Appliances for Cataract Operations (with woodcuts). By RUSSELL MURDOCH, M.D., Baltimore, Md. 467

A Case of Tubercle of the Iris (with chromo-lithograph). By H. S. SCHELL, M.D., Philadelphia, Pa 472

A Case of Tuberculosis of the Ciliary Body and Iris. By O. F. WADSWORTH, M.D., Boston, Mass. 474

A Personal Experience with Prismatic Glasses. By S. F. MCFARLAND, M.D., Oxford, Chenango Co., N. Y. 479

On the Apparent Curvature of Surface produced by Prisms (with woodcuts). By O. F. WADSWORTH, M.D., Boston, Mass. 481

A Case of Sympathetic Neuro-Retinitis. By JAMES A. SPALDING, M.D., Portland, Me. 486

Report of Thirty-five Cases of Cataract Extraction. By DAVID WEBSTER, M.D., New York 497

Notes on Ocular Therapeutics. By W. W. SEELY, M.D., Cincinnati, O. .. 510

The Treatment of Detachment of the Retina. By W. F. MITTENDORF, M.D., New York 513

Two Cases of Ectopia Lentis, Congenital Double; one Case Non-Symmetrical, the other Symmetrical (with woodcuts). By W. S. LITTLE, M.D., Philadelphia, Pa 521

On the Employment of Nitrous Oxide as an Anæsthetic in Ophthalmic Operations. By GEORGE T. STEVENS, M.D., New York 524

A Contribution to the Operative Treatment of Glaucoma. By ALBERT G. HEYL, M.D., Philadelphia, Pa. 528

PAGE

Some Additional Remarks on the Theory of the Astigmatic Pencil (with woodcut). By GUSTAVUS HAY, M.D., Boston, Mass 549

Four Cases of Sarcoma of the Uveal Tract (with woodcut). By CHARLES J. KIPP, M.D., Newark, N. J. 557

Case of Ossification of the Choroid. By CHARLES J. KIPP, M.D., Newark, N. J. 564

Two Cases in which "Trituration of the Cortex" was Practised in Connection with Preliminary Iridectomy to Hasten the Development of Slowly Ripening Cataract. By SAMUEL THEOBALD, M.D., Baltimore, Md ... 566

Vaseline Cerate—A Convenient Basis for Ointments Intended for Application to the Eyelids. By SAMUEL THEOBALD, M.D., Baltimore, Md... 572

A Case of Blindness from Retinal Thrombosis in Consequence of Facial Erysipelas. By H. KNAPP, M.D., New York 573

Changes in Refraction Resulting from a Blow. By W. H. CARMALT, M.D., New Haven, Conn 579

A Case of Blepharoplasty, According to the British Method. By EMIL GRUENING, M.D., New York 586

Case Illustrating the Difficulty in Recognizing Glioma. By LUCIEN HOWE, M.D., Buffalo, N. Y. 591

Commotio Retinæ; or Some of the Effects of Direct and Indirect Blows to the Eye. By E. EUGENE HOLT, M.D., Portland, Me. 593

Two Cases of Ophthalmoplegia Externa, Associated with Disease of the Optic Nerves, from Brain Tumor, with an Account of the Post-mortem Examination. By CHARLES STEDMAN BULL, M.D., New York 608

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OF THE

AMERICAN OPHTHALMOLOGICAL SOCIETY.

1883-84.

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DR. C. SCHWEIGGER.....Berlin, Prussia.

Total..... 3
Whole number..... 88

MINUTES OF THE PROCEEDINGS.

NINETEENTH ANNUAL MEETING.

HOTEL KAATERSKILL,
CATSKILL MOUNTAINS, *July* 18, 1883.

THE Society was called together at its nineteenth annual meeting at 10.30 A.M., by the President, DR. H. D. NOYES, of New York, who made a few congratulatory remarks, and then appointed the following committees:

Committee on Bulletin—DRS. F. B. LORING, of Washington, and E. W. BARTLETT, of Milwaukee.

Auditing Committee—DR. D. WEBSTER, New York.

Committee on Membership—DRS. J. GREEN, of St. Louis; E. GRUENING, of New York; O. F. WADSWORTH, of Boston; S. THEOBALD, of Baltimore, and E. DYER, of Newport.

The Treasurer's report was read and referred. It was subsequently reported that the accounts and vouchers were correct and the report was accepted.

Dr. Green, on behalf of the Committee on Membership, recommended the following names: Dr. B. E. Fryer, U.S.A., Fort Leavenworth; Dr. J. A. Andrews, Staten Island; Dr. L. Webster Fox, Philadelphia; Dr. James L. Minor, of New York, and these gentlemen were elected members of the Society.

The resignation of membership of Dr. T. G. Morton was read and accepted.

The President received the report of the Committee on

Bulletin, and called on Dr. Myles Standish to read Dr. H. Derby's paper.

1. "Influence on the Refraction of Four Years of College Life." The paper was discussed by Drs. Hutchinson, Webster, Mittendorf, Seely, Gruening, Carmalt, and Little.

2. "Some Improvements in Instruments and Appliances for Cataract Operations," by Dr. Murdoch. Discussed by Drs. Gruening, Noyes, and Theobald.

3. "Case of Tubercle of the Iris," by Dr. Schell. Discussed by Dr. H. D. Noyes.

4. "Case of Tuberculosis of Ciliary Muscle and Iris," by Dr. Wadsworth. Discussed by Drs. Prout, Gruening, and Webster.

5. "A Personal Experience with Prismatic Glasses," by Dr. McFarland. Discussed by Drs. Webster and McKay.

6. "On the Apparent Curvature of Surface Produced by Prisms," by Dr. Wadsworth.

7. "A Case of Sympathetic Neuro-Retinitis," by Dr. Spalding. Discussed by Drs. Webster, Kipp, Prout, Mittendorf, Schell, Theobald, H. W. Williams, Dyer, Green, Knapp, H. D. Noyes, Seely, and Buller.

8. "Thirty-five Cases of Cataract Extraction," by Dr. Webster. Discussed by Drs. Dixon, Strawbridge, Carmalt, and Noyes.

9. "Notes on Ocular Therapeutics," by Dr. Seely. Discussed by Drs. McKay, Hay, Gruening, Knapp, and Kipp.

The Society then adjourned to meet at 8 P.M.

The Society met at 8.30 P.M. The minutes of the morning session were read and approved. The order of Bulletin resumed.

10. "The Treatment of Detachment of the Retina," by Dr. W. F. Mittendorf. Discussed by Drs. Gruening, Little, Andrews, Spalding, Webster, and Theobald.

11. "Two Cases of Congenital Ectopia Lentis—the One Symmetrical, the Other Unsymmetrical"—by Dr. Little. Discussed by Dr. Mittendorf.

12. "The Employment of Nitrous Oxide Gas in Surgical Operations on the Eye," by Dr. Geo. T. Stevens. Discussed by Drs. Knapp, Strawbridge, H. D. Noyes, Buller, and R. H. Derby.

13. "A Contribution to the Operative Treatment of Glaucoma," by Dr. Heyl. Discussed by Drs. Webster, Noyes, and Seely.

14. "Some Additional Remarks on the Astigmatic Pencil," by Dr. Hay. Discussed by Dr. Knapp.

15. "Case of Sarcoma of the Choroid with Interesting Clinical Features," by Dr. Kipp. Discussed by Drs. Howe and Mittendorf.

16. "Case of Ossification of the Choroid, probably the Result of Congenital Disease of the Choroid," by Dr. Kipp.

17. "Trituration of the Cortex, with Preliminary Iridectomy," by Dr. Theobald. Discussed by Drs. Gruening, Kipp, Mittendorf, Knapp, Wadsworth, Webster, Fox, Noyes, Green, and Dyer.

The Society went into executive session.

The chairman of the Committee on Membership offered the name of Dr. E. E. Holt, Portland, Me., as candidate. Dr. Holt was elected.

The Society adjourned to meet at 9 A.M. of July 19th.

July 19th, 9.30 A.M.

The Society called to order by the President. The minutes of the last session read and approved. The Treasurer moved that the dues for the coming year be placed at five dollars. This motion was seconded and carried. The bulletin was again taken up.

18. "Vaseline Cerate—a Convenient Basis for Ointment intended for Application to the Eyelids," by Dr. Theobald. Discussed by Dr. Carmalt.

Dr. Knapp spoke in reference to Dr. Hay's paper of yesterday, as did Drs. Noyes, McKay, and Thomson.

19. "Blindness from Retinal Thrombosis in Consequence of Facial Erysipelas," by Dr. Knapp. Discussed by Drs. Buller, Kipp, Noyes, and Seely.

20. " Changes in Refraction, Resulting from a Blow," by Dr. Carmalt. Discussed by Drs. Knapp, Seely, Noyes, and F. B. Loring.

22. " Blepharoplasty, according to the English Method," by Dr. Gruening. Discussed by Drs. Howe, Green, Wadsworth, Knapp, Kipp, and Andrews.

25. " History of a Case Illustrating the Difficulty of Differential Diagnosis of Glioma," by Dr. Howe, with a specimen. Discussed by Drs. Andrews and Noyes.

26. "Commotio Retinæ from the Effects of an Indirect Blow," by Dr. Holt. Discussed by Drs. Theobald, Noyes, Seely, Webster, McKay, Gruening, Knapp, Kipp, and Wadsworth.

27. By title: " Two Cases of Ophthalmoplegia Externa, associated with Disease of the Optic Nerves from Brain Tumor, with an Account of the Post-Mortem Examination," by Dr. Bull.

Verbal communications were now received.

Dr. F. B. Loring referred to a case of fracture of the lens by hanging, as did Drs. Green and Howe. Dr. R. H. Derby also referred to three such cases which he had reported to the New York Ophthalmological Society. Dr. McKay spoke of a case of coloboma of the iris. Dr. Theobald showed a modification of his bandage. Dr. Mittendorf showed a preparation of jequirity bean, also of yellow oxide of mercury, and mydriatics and myotics in the form of an impalpable powder. Dr. Wadsworth spoke of the fact that a solution of eserine is not altered in power in consequence of a high color. Dr. Seely preferred an old solution.

The Society went into executive session.

The Chairman of the Business Committee spoke of a recommendation of the Otological Society, that Newport should be selected as the permanent place of meeting of this Society. The chairman made this recommendation. A vote was taken which resulted, for Newport 13, for Catskills 14.

Dr. Green moved a reconsideration of this vote, and that ballot be taken on place of meeting. In the first vote Coney

Island received 1; Thousands Islands, 1; Niagara Falls, 4; Catskills, 10; Newport, 13.

By motion the three places receiving the smallest number of votes were thrown out.

Vote was now taken and resulted, Catskills, 16; Newport, 11; and Catskills selected as place of meeting for next year.

The election of officers resulted as follows:

President—DR. H. D. NOYES.

Vice-President—DR. W. F. NORRIS.

Secretary and Treasurer—DR. RICHARD H. DERBY.

Corresponding Secretary—DR. J. S. PROUT.

Publishing Committee—DR. E. G. LORING, and DR. D. B. ST. JOHN ROOSA.

Adjourned.

Present at the nineteenth annual meeting:

DR. J. A. ANDREWS.
DR. E. W. BARTLETT.
DR. F. BULLER.
DR. W. H. CARMALT.
DR. RICHARD H. DERBY.
DR. E. DYER.
DR. L. WEBSTER FOX.
DR. JOHN GREEN.
DR. EMIL GRUENING.
DR. GUSTAVUS HAY.
DR. ALBERT G. HEYL.
DR. E. E. HOLT.
DR. LUCIEN HOWE.
DR. EDWIN HUTCHINSON.
DR. SAMUEL J. JONES.
DR. CHARLES J. KIPP.
DR. H. KNAPP.
DR. W. S. LITTLE.
DR. F. B. LORING.
DR. S. F. MCFARLAND.
DR. R. J. MCKAY.
DR. C. S. MERRILL.
DR. W. F. MITTENDORF.
DR. RUSSELL MURDOCH.
DR. HENRY D. NOYES.
DR. J. S. PROUT.
DR. H. S. SCHELL.
DR. W. W. SEELY.
DR. J. A. SPALDING.
DR. GEO. T. STEVENS.
DR. SAMUEL B. ST. JOHN.
DR. GEO. STRAWBRIDGE.
DR. SAMUEL THEOBALD.
DR. WILLIAM THOMSON.
DR. J. J. B. VERMYNE.
DR. O. F. WADSWORTH.
DR. DAVID WEBSTER.
DR. H. W. WILLIAMS.

Present by invitation:

DRS. T. Y. SUTPHEN, Newark; R. H. JOHNSON, Philadelphia; MYLES STANDISH, Boston; SWAN M. BURNETT, Washington.

RICHARD H. DERBY, M.D.,
Recording Secretary.

INFLUENCE ON THE REFRACTION OF FOUR YEARS OF COLLEGE LIFE. ILLUSTRATED BY THE STATISTICS OF THE LAST FOUR CLASSES GRADUATING FROM AMHERST COLLEGE.

BY HASKET DERBY, M.D.,

BOSTON, MASS.

AT the meeting of the Society, held in 1879, I presented[1] the statistics of refraction of the four classes entering Amherst College in the years 1875, '76, '77, and '78; as well as the figures furnished by the examination of the first of these classes just previous to its graduation. I have since examined the three remaining classes, at the time of their leaving college, and would now complete my task by combining and classifying all the results thus obtained.

Rejecting from the original number of 341 examined at entrance, those individuals who left their classes previous to graduating, I have been able, in 254 instances, to trace the refraction through the whole term of four years.

The examinations were all personally conducted with glasses, and in many cases, certainly in all doubtful ones, with the ophthalmoscope. The results given are those obtained by glasses. The use of atropine was wholly impracticable, as my investigations were made at a time when the full work of the term was going on, and the students could not possibly have been allowed to be even temporarily disabled from the active prosecution of their studies.

I have followed the example of Emmert and Loring in stating degrees of ametropia as slight as 0.5 D, but have included nothing less.

[1] See Transactions, vol. ii., part v., p. 530.

The average age of those whose examination is here recorded was, at entrance, nineteen; at graduation consequently twenty-three. This gave the whole investigation a peculiar interest. The number of cases at my command was, it is true, extremely small when compared with the ample statistics obtained by other observers here and abroad, but it was one of the few attempts yet on record to trace the modification of refraction among the more highly educated, during this particular period of life, and for a continuous term of years, and it offered some opportunity of testing the reliability of certain beliefs, long and generally held, with reference to possible changes in refraction at this age, and which will be referred to under the head of emmetropia.

The general results obtained may be grouped as follows:

	Refraction at entrance.	Refraction at graduation.
	Cases.	Cases.
Hypermetropia.....	39	47
Myopia.....	90	120
Emmetropia.....	125	87
	254	254

Furnishing the following percentage:

	At entrance.	At graduation.
Hypermetropia.....	15.4	18.5
Myopia.....	35.4	47.2
Emmetropia.....	49.2	34.3

Analyzing, now, the ametropia, I find under the head of manifest hypermetropia, of which there were 39 cases at entrance, 1 changed to myopia, 2 diminished, 27 remained stationary, 9 increased in amount. Average hypermetropia at entrance 0.7 D (0.698); average hypermetropia at graduation, the same.

I.—*Table of Changes in Hypermetropia during the Four Years.*

Entrance age.	Original refraction.		Changed to	
16	Hypermetropia	1 D	Hypermetropia	1.25 D
18	"	0.5 D	"	0.75 D
19	"	0.75 D	"	1 D
18	"	0.75 D	"	1 D
18	"	0.5 D	"	1 D
17	"	0.5 D	"	0.75 D
18	"	3 D	"	3.5 D
19	"	1.75 D	"	2 D
18	"	0.5 D	"	0.75 D
18	"	0.5 D	Myopia	1.25 D
19	"	1 D	Hypermetropia	0.5 D
21	"	0.5 D	Emmetropia.	

Remarks.—The case changing from hypermetropia to myopia was tested with the mirror at each examination, the first one showing apparent emmetropia. He claimed, however, that his vision, which was above the normal standard, being $\frac{1}{1}$, remained quite as sharp and clear when the convex glass was interposed.

In the second case in which the hypermetropia diminished, each examination was made both by glasses and mirror, the results being the same.

MYOPIA.

There were at entrance 90 cases; of these 32 remained stationary, 58 increased in amount, namely:

By 0.25 D....	8	By 1.75 D....	2
" 0.5 D.....	20	" 2 D.....	2
" 0.75 D....	7	" 2.25 D....	2
" 1 D.....	8	" 2.5 D.....	1
" 1.25 D....	2		—
" 1.5 D.....	6		58

Average myopia at entrance..... 1.8 D (1.786).
Average myopia at graduation (the same students being taken)..... 2.4 D (2.436).
Average increase of myopia ..... 0.6 D

The following table gives an analysis of the cases in which the myopia increased, together with such scanty information with regard to the industry, health, or habits of the individuals as I was able to obtain from instructors.

II.—*Table of Changes in Myopia during the Four Years.*

Entrance age.	Original myopia.	Amount of increase.	Remarks.
18..	0.5 D	0.25 D	Very studious and capable.
24..	1.5 D	"	Dull student, but faithful and hard working.
15..	1 D	"	Very poor student.
17..	1.5 D	"	Second scholar in the class.
18..	0.5 D	"	Average man.
21..	3.25 D	"	Poor scholar.
20..	0.5 D	"	Very close student.
19..	0.75 D	"	Faithful worker.
20..	1 D	0.5 D	Faithful, plodding student; average ability.
22..	0.75 D	"	Very hard worker; ordinary scholar.
20..	0.75 D	"	Average student.
17..	1.25 D	"	Very good worker and scholar.
19..	0.5 D	"	Ordinary scholar; quite an athlete.
24..	1 D	"	Dull student; hard worker.
24..	0.5 D	"	Poor health; good scholar.
18..	1.25 D	"	A close student, not physically strong.
18..	0.5 D	"	Superior scholar.
21..	5.5 D	"	Poor scholar.
18..	2.5 D	"	Faithful student.
21..	0.75 D	"	Excellent and hard student.
16..	0.75 D	"	Hard worker.
19..	0.5 D	"	Very faithful worker.
18..	1 D	"	Not a close student.
18..	1.25 D	"	Not a close student.
17..	1.75 D	"	Average man.
19..	1.75 D	"	Very faithful in work.
18..	4.5 D	"	Very faithful.
18..	4 D	"	Very faithful.
17..	1.5 D	0.75 D	Very good scholar and student.
19..	1.5 D	"	Hard student.
19..	0.75 D	"	Physically weak; ailing continually.
18..	2D	"	Faithful student.
17..	1.75 D	"	Works hard on German.
19..	0.75 D	"	Very faithful.

Table of Changes in Myopia.—Continued.

Entrance age.	Original myopia.	Amount of increase.	Remarks.
20..	0.5 D	"	Faithful.
21..	2.5 D	1 D	Good student; constant.
20..	7 D	"	Average man; hard worker.
20..	1.5 D	"	Very hard worker, especially in German.
16..	2.5 D	"	Excellent scholar.
17..	5 D	"	Faithful and successful scholar; takes but little exercise.
18..	1.25 D	"	Not strong; a close student.
19..	2 D	"	Very faithful.
17..	4 D	"	Very close student.
17..	0.75 D	1.25 D	Healthy, lazy; poor scholar.
18..	2.25 D	"	First scholar in his class.
20..	1.25 D	1.5 D	Very hard worker.
16..	0.75 D	"	Excellent scholar.
18..	2 D	"	Faithful student.
17..	2.5 D	"	Eyes very troublesome, preventing much study.
18..	2.5 D	"	Faithful student.
19..	0.75 D	"	Hard worker.
16..	0.75 D	1.75 D	Excellent scholar.
17..	2.25 D	"	Very close student.
21..	1.5 D	2 D	Good, constant student.
17..	1 D	2 D	Very faithful student.
15..	1.75 D	2.25 D	Extremely negligent.
18..	1.25 D	"	Faithful student.
17..	1 D	2.5 D	Very faithful student.

EMMETROPIA.

While the preceding table shows no greater change than was perhaps to be expected in the refraction of the myopes examined, and is mainly of interest as affecting the views already advanced by American observers in regard to the limited percentage of myopia among the educated classes of the country, when compared with those of Germany, Switzerland, and Russia, the observations with regard to the cases of original emmetropia will be found to possess peculiar interest, their result somewhat militating against theories that have found general acceptance.

We find no less an authority than Donders writing as follows: "I have extremely rarely seen near-sightedness arise after the fifteenth, and never after the twentieth year, in eyes

which were previously normal."[1] "After the twentieth year," says Mauthner, "the development of regular myopia is scarcely to be expected."[2]

Erismann also claims that, "after the sixteenth year, an eye that has thus far remained hypermetropic or emmetropic seldom develops myopia."[3] And Loring says it cannot be doubted that these statements are in the main correct, and in accordance with the experience of every observing oculist. His own opinion is given as follows: "After the eighteenth, or even sixteenth year, when the investing membrane of the eye has become firm and unyielding, over-study may produce other and graver diseases of the eye, but it will not produce near-sightedness."[4] Finally, Arlt observes: "The growth of the eye is wholly or nearly completed at the time of puberty, certainly by the twentieth year. The form of an eye, emmetropic or hypermetropic, at this period, remains nearly or wholly unchanged up to old age."[5]

It will be seen, however, that the above statements are contradicted by the following figures:

There were at entrance 125 cases of emmetropia. Of these, 86 (68.8 per cent.) remained emmetropic; 10 (8 per cent.) developed hypermetropia; 29 (23.2 per cent.) developed myopia. The average age of those thus developing myopia

[1] Accommodation and Refraction of the Eye, p. 348. 1864.

[2] Vorlesungen über die optischen Fehler des Auges, s. 491.

[3] A. f. O., Bd. xvii., Abth. 1, s. 14.

[4] Is the Human Eye Changing its Form under the Influence of Modern Education, p. 22.

I find that the above does not fairly represent Dr. Loring's views on this point, but is intended to simply state the general rule. That he admits exceptions is evident from the following, written two years earlier: "Clinical experience would point to such a conclusion, for it is a fact that cases occur where myopia with all its characteristic signs is produced in eyes which were previously normal; that is, in the eyes of adults, who have passed therefore the period of development, and whose family history shows no hereditary tendency. This, too, notwithstanding Donders's (21) assertion that he has never seen 'myopia arise after the twentieth year in eyes which were previously normal.' I have seen several such cases, and I doubt not that most practising ophthalmologists have had the same experience."—Progressive Myopia, p. 8.

He evidently, however, considers such cases more exceptional than my experience would seem to indicate.

[5] Über die Ursachen und die Entstehung der Kurzsichtigkeit, s. 29. 1876.

was very nearly nineteen (18.76) at entrance, twenty-three at graduation.

In	4	cases	myopia 0.5 D	resulted.
"	13	"	" 0.75 D	"
"	3	"	" 1 D	"
"	3	"	" 1.25 D	"
"	3	"	" 1.5 D	"
"	2	"	" 1.75 D	"
"	1	"	" 2 D	"

The average myopia developed thus amounted to nearly 1 D (0.982).

III.—*Table of Change from Emmetropia to Myopia during the Four Years.*

Entrance age.	Amount of myopia developed.	Remarks.
20	0.5 D	Weak intellect, but faithful worker.
19	"	Average student.
19	"	Very good and close student.
18	"	Superior physically and intellectually.
21	0.75 D	Bright scholar; good gymnast.
18	"	An average student in all respects.
18	"	Delicate health; good scholar.
17	"	Superior scholar.
18	"	Average man.
17	"	Average in all things.
21	"	Very lazy.
18	"	Poor physique; neglects exercise.
17	"	First-class worker.
19	"	Very faithful scholar.
17	"	Very close student.
22	"	Hard student.
20	"	Hard worker.
16	1 D	Hard worker; studied very hard to his own injury.
19	"	Hard worker.
20	"	Hard worker.
16	1.25 D	Hard worker; abused himself by over-study.
20	"	Very hard worker; slow intellect.
23	"	Very hard student.
18	1.5 D	Uncertain health; good student.
18	"	Very hard student.
18	"	Acquires easily, but not hard student.
17	1.75 D	Very close student.
22	"	Hard student.
18	2 D	Faithful.

As has already been admitted, any generalization from these results may well be objected to on the ground that the number of individuals examined was comparatively limited. On the other hand the cases have all been followed up with extreme care, for an unusually long period, and are collected among subjects whose age was unusually advanced. They will at least avail as an instalment of that fund of statistics on which our knowledge of the influence of age and education on refraction is to be founded, a knowledge which as yet rests on a basis in part theoretical.

So far as these figures go they tend to show, first: the large amount of myopia, even in this country, among the educated classes. Dr. Loring's combined table of observations,[1] made on the eyes of scholars up to the age of 21, in various countries, gives the German percentage of myopia as 62.10, the Russians 42.8, and the American 26.79. My own investigations gave me, among 443 freshmen at Harvard and Amherst, a myopic percentage of 34; at graduation, at Amherst a percentage of 47.2. It is difficult, however, to compare Dr. Loring's figures with my own, as his statistics were based on observations, made between the ages of 6 and 21, and mine between 18 and 23. But all researches, made at this latter age, go to prove that at least, or very nearly, one-half of the educated community is myopic, in this as well as other countries.

Moreover, contrary to the impression so long entertained, myopia may be acquired at, or near, the twentieth year, from the same causes that produce it at an earlier age, and may continue to progress until the course of study is completed.

REMARKS.

DR. WEBSTER asked if Dr. Derby thought the students were originally hypermetropic and became myopic, in other words, does he believe that the antero-posterior diameter of the eyeballs in those cases actually become longer.

DR. STANDISH said he could only answer by saying that the examinations were made by glasses, and in all doubtful

[1] Are Progressive Myopia and Conus due to Hereditary Disposition, p. 10. Philadelphia, 1877.

cases the eyes were examined by the ophthalmoscope. He presumed that there was no manifest hypermetropia under ophthalmoscopic examination.

DR. WEBSTER would like to know if the emmetropic eye ever becomes hypermetropic from over-use; that is, does it actually change its diameter. He could not understand how an emmetropic eye can become hypermetropic through changes in the refractive media.

DR. SEELY asked if Dr. Derby had taken into consideration apparent myopia, and said the statistics given would not be so conclusive had this not been considered; another question, that with regard to the appearance of the eyes, diseases of the eyeball, etc., as indications of refraction.

DR. STANDISH said there were no statistics upon these points.

DR. GRUENING said he wished to make an observation, not so much concerning the subject under consideration in the paper as upon a term used by the author. Dr. Derby used the term Dioptric. We have now three different terms by which measurements are designated, dioptric, dioptrie, and dioptre. He thought we should reach some conclusion with regard to the proper term to be employed. English writers use the term dioptric, and this has been endorsed by Americans. Dr. Gruening thought it preferable to either the term dioptrie or dioptre. The word dioptrie he regarded as the worst that could be used. He would like to have the matter settled if possible, so as to establish a definite term.

DR. CARMALT could not regard the statistics presented by the paper as of any value. On the contrary, he thought them liable to lead to false conclusions if they were accepted. Living in a university town, and being called upon frequently to examine the refraction of students during "term time," he had found such examinations without artificial paralysis of A. quite uncertain. A moderate degree of spasm of A. was almost the rule among the *hard* students at the latter end of the term. He has almost every year been requested by students to give them glasses for (a manifest) near-sightedness, acquired, as they thought, within the previous few months. In a large number of these cases the instillation of atropia had reduced the M. to Em., sometimes to slight, and exceptionally to high degrees of H. In other cases apparent M. had been quite eliminated by a few days more or less of rest with soothing applications to the eyes—so that he had learned to distrust all cases of M. of moderate degrees, or of asserted increase in pre-existing M. until atropia had been instilled.

The claim that the ophthalmoscopic determination of the refraction removed any possible source of error in the examination by types and glasses was even more questionable. If a person, a student habitually makes an effort of his A. as in Hm. this is *not* relieved by simply placing him in a dark room for ophthalmoscopic examination and bidding him to look at vacancy; on the contrary, Dr. Carmalt believed that *usually* the spasm is increased, certainly it not infrequently is so, by throwing the light into the eye, the contraction of the pupil of course to some degree aiding (or exciting) the ciliary muscle in the movement. The fact that the observer was able to relax his own A. does not imply that the patient does also or is even able to if he knew what was desired of him, and until he does this his refraction for ophthalmoscopic examination is exactly what he makes it by the action of the ciliary muscle, and this may be either contracted or relaxed according to circumstances not under the control of the observer.

Dr. Carmalt was sorry that Dr. Derby was not present to take part in the discussion, as he could undoubtedly make some points in the paper clear that now seemed doubtful, but as it was to be printed as read, it did not seem advisable to have it published without calling attention to the possible sources of error.

DR. LITTLE thought that in making such examinations the general condition of the student should be taken into consideration, as for instance, it was well known that the refraction after typhoid fever and after diphtheria showed variations from the condition observed in health.

DR. HUTCHINSON asked if Dr. Derby had ordered special glasses, and also if there was any effort made to prevent an increase in the refractive error.

DR. STANDISH said he was unable to answer the question positively but he thought that no glasses were ordered.

[Being unexpectedly prevented from presenting the foregoing paper in person, and hence from answering any of the questions or objections brought forward during the discussion, in which my absence was regretted, I now take the opportunity of briefly alluding to them.

Both of Dr. Webster's questions are answered by Dr. E. G. Loring, in "Progressive Myopia and Conus," p. 11, Philadelphia, 1877. He says: "If a hypermetropic eye can become emmetropic by increasing its refraction, it would be

absurd to deny that it could not, by a little further increase, become myopic." And again: "The slight increase in the hypermetropia may be explained by a small amount of latent H. becoming manifest as the age advanced."

With regard to Dr. Carmalt's somewhat sweeping criticism on the value of my statistics, I would state that the usual pains were taken to avoid recent accommodative spasm as a source of error. I fully recognize the possibility of its occurrence among students, although I am bound to bear witness to its greater rarity in the latitude of Harvard than in that of Yale. Without being able to state positively that I asked the question in each individual case, the impression left on my mind is that these students generally testified to noticing a gradual falling off, during the college course, in their acuteness of vision for distant objects. My investigations were not made at times when the classes had been through periods of unusually hard work.

I make no claim that the ophthalmoscopic examinations remove any possible source of error, being more inclined than formerly to admit the justice of the view that there are cases of spasm and faults of refraction not to be penetrated by the aid of the mirror. It must surely, however, be allowed that the ophthalmoscope often discloses the true state of refraction, and that its employment in a doubtful case—while not insuring a perfect diagnosis—tends to eliminate a possible source of error. The desirability of making all examinations of this kind under atropine is evident; the practical difficulties in the way of its employment are, however, as in the present series, occasionally insuperable. And I cannot admit that its non-use nullifies our results.—H. D., January, 1884.]

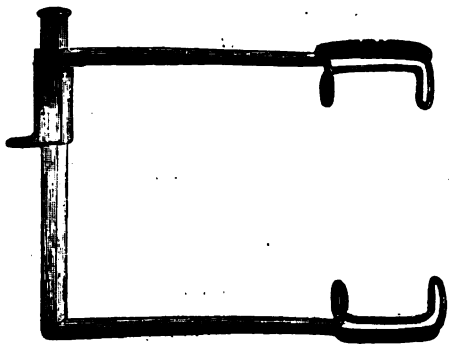
SOME IMPROVEMENTS IN INSTRUMENTS AND APPLIANCES FOR CATARACT OPERATIONS.

(*With Woodcuts.*)

BY RUSSELL MURDOCH, M.D.,
BALTIMORE, MD.

IN July, 1874, I showed to this Society an eye speculum and an ophthalmostat, or self-holding eye forceps, and have with me, though modified, the same instruments.

Speculum.—One blade of the speculum has attached at



right angles to it a bar, and the other in like manner a closely fitting canula. At the end of the bar is a button, which forms a shoulder that prevents the canula from slipping off, and on the side of the canula is a finger-rest, which is a handle to slide the canula on the bar. The blades are opened by approximating the button and finger-rest, and closed by reversing the action. The distinguishing features, therefore, of this speculum are the absence of spring and set screw. In this the lids themselves lock the instrument. The blades are long

arms of mutually opposed levers, and are at right angles to their short arms—the bar and encircling canula. When the lids press the long arms together, the short ones would separate, but are prevented by the extended bearing and the close fitting of the canula on the bar. The least interruption of their parallelism suffices, as well as the greatest possible pressure to completely lock them, and on the other hand, power applied in a parallel direction to their short arms, as by button and finger-rest, unlock and at the same time slide them on each other.

Ophthalmostat.—My former ophthalmostat is in this so changed in direction as to seize the conjunctiva in a vertical

fold, and also by means of a rectangular bend of the blades, to rotate the eyeball without dragging it. Another change is substituting for the three little hooks, one broad sliding support.

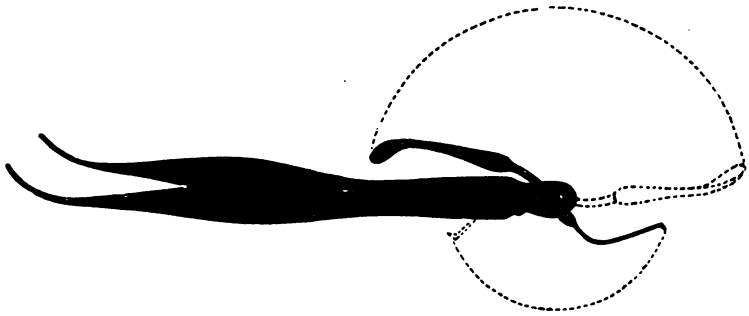
Besides these modifications of my old instruments, I have two combinations, one of Graefe's knife, end to end with Wecker's scissors, and another of iris forceps with cystotome and shell spoon.

Knife and Scissors Combination.—In the first the scissors

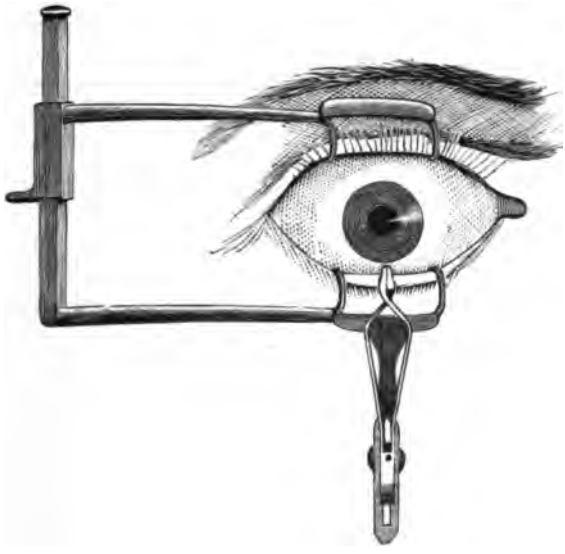
form a convenient handle to the knife, and in the second the iris forceps an equally good one to the other two instruments.

Iris Forceps with Cystotome and Shell Spoon.—This latter combination of three in one is rendered possible by extending upward the blades, uniting the cystotome and spoon end to end, and where joined, pivoting them between the extended blades of the forceps.

Advantages.—Counting as one the speculum and ophthalmostat, which they become in fact as soon as united, seven instruments are reduced to three in performing the modified

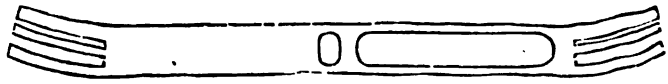


linear extraction of cataract; also an assistant skilled in the manipulation about the eye is dispensed with. My assistant devotes himself exclusively to the administration of an anæsthetic.



Modified Linear Extraction of Cataract.—The above-mentioned operation, as I have performed it for over ten years, is as follows: The speculum is introduced with closed blades; it

is then opened sufficiently wide to attach the ophthalmostat, first to the eye and then to the bridge on the speculum. The knife is taken in the right hand and iris forceps in the left. The latter can, if desired, reinforce the ophthalmostat and guide the eye while the section of the cornea is being made. After this, the knife and scissors combination is rotated by the thumb and fingers of the same hand, and, with the scissors, the iris is cut as soon as it is exposed by the forceps. Then the scissors and knife are laid down, and the iris forceps are passed from the left to the right hand. This passing from one hand to the other will, of itself, rotate the forceps, so that they point up the arm while the cystotome comes into its proper place, and is in readiness for the capsulotomy. Finally the spoon is revolved around the pivot in the place of the cystotome, and is held there by a catch while delivering the lens. It is important to remember that the left hand is



free either to loose the ophthalmostat and speculum, or to make the revolution of the cystotome and spoon, after the forceps combination is passed to the other hand, and that prior to this accidents which require prompt closure of the lids are infrequent. It is also to be noticed that the operator need never lift his eyes from the eye of the patient, nor lose time unnecessarily between the steps of the operation.

Bandage.—I have also with me a quickly made and easily applied flannel bandage. It is seven-eighths of a yard long, including strings, and three inches broad. To make it, the head is first encircled, and then from the surplus ends six equal half-inch broad strings, and from one-half of the bandage two oval openings are cut for the ear next to the operated eye and the back of the head. The uncut half passes across the eyes, and is tied at the side of the head. If pressure should be uncomfortable over the nose, the flannel may be notched. In dressing the eyes, the front only is lifted, as the ears and the back of the head hold the other half. I avail myself of this, and

half apply the bandage before commencing to operate, so as to, if occasion calls for it, apply the front half.

This binocular is converted into a monocular bandage by cutting pieces from the flannel where indicated by the interrupted lines in the drawing.

REMARKS.

DR. GRUENING, of New York, said that those who practise within the limits of civilization do not require so much multum in parvo. He said these complicated instruments should be discarded entirely, as they were very liable to get out of order, as had already been demonstrated by the instrument presented, which had become so disordered that the inventor was unable to use it himself.

With regard to the bandage, he thought the ordinary roller bandage could not be replaced by anything which has yet been brought forward. No bandage can produce the pressure that can be obtained by the use of the flannel bandage. It is necessary to immobilize the eye after a cataract extraction, and this cannot be done by any substitute for this bandage.

THE PRESIDENT said that he had had some experience concerning the use of the little forceps for fixation, and long ago he gave up the scheme, chiefly because it does not give so much control as one might imagine. He had also found that there was a liability to tear the conjunctiva in opening the eye with the speculum that had such an attachment to it. Again, the line of traction was not exactly what was desirable, and, besides, the operator had no ability to follow the eye and keep the whole hand in complete consonance with its movements. With the forceps in one's own hand, the operator can keep the hand in harmony with the movements of the eyeball, and make the pressure or traction correspond with the behavior of the eye. Under anæsthetics, this objection is overcome to some extent, although not entirely; and he had reached the conclusion that the operator's own hand should be used in the operation. Where an assistant can be obtained, he preferred to use the forceps himself.

DR. THEOBALD, of Baltimore, said that Dr. Gruening, in speaking of the bandage, had stated that with the flannel roller the eye could be entirely immobilized. He thought, however, that this was a mistake; that it was impossible, after a delicate operation, such as iridectomy or cataract extraction, to immobilize the eye with any form of bandage, because the amount of pressure required to do this was in-

admissible under such circumstances. The long flannel roller he considered especially objectionable in hot weather.

DR. GRUENING said he would not insist upon the flannel bandage, but would insist upon the long bandage. He had of late used a gauze bandage, dipping it into water before applying it, and had found that it makes a very firm bandage. As to whether the eye can be immobilized by the roller bandage, he wished to state that it can be when the bandage is properly applied, but if improperly applied it cannot be immobilized. If applied over the eye simply, it will make pressure upon the most prominent point, perhaps upon the bridge of the nose or upon the brow, and beneath it the eyeball has abundant opportunity to move. Therefore, the first thing to be done is to fill up the depression, so that when the hand is laid over the orbit, the brow and the bridge of the nose are not felt, and the hand rests upon the pad; now, if upon that pad pressure is made with the roller bandage, immobilization of the eye can be secured.

DR. THEOBALD thought that if Dr. Gruening would apply the bandage to his own eyes in the manner described, he would find that the eyeball is not immobilized.

A CASE OF TUBERCLE OF THE IRIS.

(With Chromo-Lithograph.)

BY H. S. SCHELL, M.D.,
PHILADELPHIA, PA.

THE patient, a schoolboy, nine years of age, applied for treatment at Wills' Eye Hospital on August 29, 1881. The left eye had then been painful for four days. The iris was bound down everywhere by posterior synechiæ and the pupil would not dilate under atropia. The eye exhibited the usual signs of ordinary plastic iritis. The inunction of mercurial ointment and free local use of atropia were prescribed. When seen again, on September 16th, this treatment had produced no effect, but was continued for a few days longer, with the addition of small doses of calomel and opium. The boy was not seen again until he appeared in the wards of the Children's Hospital, in the latter part of October, suffering from well-marked symptoms of coxalgia in the second stage. It transpired then that there was a distinct history of phthisis on

the mother's side, that the boy had never been healthy and that the pain in the hip had been first noticed in July. Under the care of Dr. Ashhurst the usual treatment of local blistering and an extension apparatus were applied. The left eye being still a cause of complaint my attention was invited to the case. I found the eye still somewhat painful. There was a ring of circumcorneal injection, the pupil was immovable, the fibres of the iris atrophied, and projecting from the nasal side of the pupillary margin was a small yellowish-white nodule, the size of a pin's head and tinged with pink. This nodule gradually increased in size. Vision was completely lost in December, and in May, 1882, the anterior chamber was nearly filled with the new growth. The nodule was of a yellowish tinge and a few minute blood-vessels could be seen upon its surface. At this time the intraocular tension was increased and the eye was tender on pressure but not otherwise painful. The accompanying drawing represents the external appearances quite accurately. In the meantime an abscess had formed on the outer side of the thigh. It was now aspirated by Dr. Ashhurst and twenty-four ounces of pus withdrawn. The abscess rapidly refilled and opened spontaneously at the point of puncture a week later. A diagnosis of tubercle of the iris was made and on May 30th I enucleated the eye with the hope of preventing the extension of disease. Healing progressed without obvious incident. The discharge from the thigh gradually decreased, ceased in July, and the boy was discharged from the hospital in September with very good movement of the hip and but slight shortening.

The excised eye was placed in Müller's fluid and a microscopical section subsequently examined by Dr. Geo. B. Laurason, of New Orleans. He reports that the specimen shows two or three tubercular masses imbedded in a mass of organized inflammatory product. There is one small round tubercle in the left ciliary region and in front of the iris an oblong tubercular mass is seen, containing three or four plugged-up blood-vessels. The tubercles seem to have developed in the organized inflammatory product, which nearly fills the anterior and posterior chambers.

REMARKS.

THE PRESIDENT remarked that within the last year a case had come under observation in New York which presented certain remarkable difficulties in diagnosis. The patient was four years of age. The gross appearances were such as to make it impossible to distinguish between a gliomatous condition and a metastatic choroiditis. The case continued under observation several weeks without much progress. Finally the eye was enucleated, and on examination it was found that tubercular disease was the true nature of the lesion. At that time it was felt by those who saw the case to be impossible to make a satisfactory differential diagnosis between tubercular disease and the gliomatous condition.

A CASE OF TUBERCULOSIS OF THE CILIARY BODY AND IRIS.

BY O. F. WADSWORTH, M.D.,
BOSTON, MASS.

MARY MCG——, aged three and a half, was sent to me by Dr. H. Derby for consultation, on October 24th, 1882. Dr. Derby wrote: "I first saw this eye October 4th. The process had then lasted two weeks. It seemed to be a keratoiritis, as well as I could make out. The pupil was small, and remained so in spite of atropine. The cornea was hazy. Atropine, shade, fomentations, oleum morrhuæ, have been used. The eye has grown steadily worse and pain more frequent. October 10th the yellowish reflex from the pupil was first visible. Since then it has become more pronounced, and the pupil has enlarged. I have seen no vessels, but perhaps have not looked as closely as I might."

The question was as to glioma or irido-choroiditis.

The father stated that both he and the mother were in good health; that there were two children older and two younger than this one, the oldest seven years, all well, "never a doctor in the house with any of them." These statements as to

the health of the family were found later to be quite incorrect.

The child's mother had noticed redness of the left eye five or six weeks before; after a few days the child complained of light, and a handkerchief was tied over the eye. The mother said that, except when the eye was looked at or drops put in, there had been no complaint of pain till the last day or two, and then not much; that the child slept well and played about all day with a bandage over the affected eye.

I found, as had Dr. Derby, that it was very difficult to obtain a view of the eye. Even when the patient was held and the lids forcibly opened, the rolling up of the eye and the great flow of tears prevented a satisfactory inspection. The lids were natural; the cornea hazy; the conjunctiva of the bulb moderately congested, but no very marked ciliary congestion; the anterior chamber of good depth; pupil moderately dilated; the upper portion of the iris apparently thickly set with vessels; a yellowish reflex from the pupil.

My diagnosis wavered between glioma and irido-choroiditis, and I suggested to Dr. Derby the advisability of an examination under ether before advising enucleation.

Two days later, October 26th, Dr. Derby etherized the child, and found much vascularity of the upper part of the iris, but no trace of vessels in the yellow mass in the pupil.

November 15th, Dr. Derby examined again under ether, found the disease much advanced, and advised enucleation. On the following day I also examined under ether. There was considerable circumcorneal congestion. Above was a staphyloma in the ciliary region, generally dark in color, perhaps 5‴ by 3‴. No trace of iris was visible, but a growth reached forward everywhere nearly to the cornea, its surface yellowish-white and showing numerous vessels and some hemorrhages. Some vessels also extended into the cornea from its periphery.

Both Dr. Derby and I believed the growth to be a glioma. The eye was enucleated the same day by Dr. Derby, placed in Müller's fluid, and given to me for examination.

Some weeks later the eye was divided through the centre of the staphyloma, nearly in the vertical meridian. The retina and choroid lay everywhere in contact with the sclera. The greater part of the vitreous chamber was occupied by a thin serous fluid. A solid grayish mass filled the anterior part of the globe. The posterior surface of this mass, irregularly concave, extended across the globe from a little behind the ciliary body—from a point 8 mm. from the cornea below to a point 10 to 11 mm. from the cornea above. It was about 6 mm. thick in the centre. From the most prominent part of the staphyloma, which projected about 3 mm., it measured 7 to 8 mm. in thickness. Something more than the anterior half of the thickness of the mass, starting from a point 2 to 3 mm. behind the cornea below and extending upward to a little behind the posterior border of the staphyloma above, was in appearance denser and of a duller, somewhat darker tint than the rest. It was partly and irregularly divided from the posterior portion of the mass by a broken dark line, apparently the remains of the iris. The posterior part of the mass was of a lighter tint of gray and less dense, seeming somewhat fibrous and like condensed and altered vitreous. Behind the edges of the mass the retina, and the choroid so far as it could be seen, appeared normal. There was no sign of the lens.

Microscopic examination showed the greater part of the solid mass to be mainly made up of granulation tissue, varying in different parts, here containing closely packed small cells, there mostly consisting of fibres running approximately parallel. The latter were most numerous at and near the anterior border, and now and again broad bundles of the fibres curved forward to the posterior surface of the cornea. Through the mass ran large vessels, and there were remains of many hemorrhages. The pigment, irregularly scattered, was for the most part all that could be made out as remainder of the normal tissues of iris or ciliary body. Throughout this tissue, except in the more fibrous portions, were scattered rounded agglomerations of cells, more deeply stained by hæmatoxylin, and showing the characteristic cell forms and

arrangement of tubercle; giant cells, containing many nuclei, surrounded by epithelioid and small granulation cells.

The posterior layer of the mass was much more free from cells, and appeared to consist of the infiltrated and thickened remains of the vitreous. In this was seen also, in the sections, the collapsed and folded lens capsule, lined here and there for a short distance by what seemed to be its degenerated epithelium, and containing apparently some débris of lens fibres.

One-half of the globe was given to Dr. H. C. Ernst, then engaged in the investigation of the bacillus of Koch, and, although the fact that the eye had been in Müller's fluid made the search more difficult, he was able to demonstrate satisfactorily the presence of the bacillus in the specimen.

Until the result of the microscopic examination was reached there had been no suspicion of the tuberculous nature of the disease. This was the first case of the kind either Dr. Derby or I had seen, and the family history, as given by the parents, gave no indication that such disease was at all likely. Indeed, looking back now, with the knowledge of the true nature of the case before me, I um unable to recognize anything in the visible appearances of the growth when I saw it, or in the history of its course, by which it could be distinguished from a glioma, unless, perhaps, the great vascularity of the iris which preceded the development of the growth into the anterior chamber may be regarded as of some value for the differential diagnosis.

The statement that the child herself and the whole family had been free from anything pointing to tubercle made the case one of much interest to follow. The child continued in apparently good health for more than five months after the enucleation; then for five or six weeks she complained of headache, not enough to lead the parents to call a physician; suddenly became worse, and Dr. Ferguson, who was called, found her in convulsions. She died three days later with the diagnosis by Dr. Ferguson of tubercular meningitis. There was no autopsy.

It was only some time after her death that I learned from

Dr. Ferguson that he had attended the family for several years, that the child's father and a brother of the father had phthisis, and that the children had been subject to bronchial attacks.

REMARKS.

DR. PROUT asked if there was increase of tension.

DR. WADSWORTH replied that it was impossible to test tension until the patient was under ether, and at that time the entire anterior chamber was filled with the growth.

DR. PROUT said that he asked because he had had a case in which the tension was extreme, occurring in a boy six years of age, whose eye gave a whitish reflex through a small and unyielding pupil. The intra-ocular pressure was so great that the sclera was beginning to yield in the superior ciliary region. The media were not clear, and there was doubt as to whether the reflex was caused by a tumor or by exudative cyclitis or choroiditis. As the local condition seemed to impair his general health, the eyeball was enucleated and is now in the hands of Dr. C. S. Bull for microscopical examination, who has not yet had time to make a report.

DR. WEBSTER had a case under observation of supposed tubercular disease of both irides, occurring in the person of a farmer, thirty-five years of age, who when he first came under observation presented all the appearances of syphilitic iritis. There was three or four tolerably large nodules upon one iris and something of the same appearance on the other. He put him under treatment by mercurial inunction followed by the iodide of potassium, but without improvement, at the same time using atropine faithfully. The man grew worse and worse, and finally Dr. Agnew performed iridectomy upon both eyes and the operation was subsequently repeated, and still later Dr. Agnew removed the lens from one eye. The patient had recurring attacks of inflammation, but finally was discharged from the Manhattan Eye and Ear Hospital with a slight amount of vision. The trouble was diagnosed as tubercular iritis, more from the fact that the man had evidence of tubercular disease in the lungs with undoubted history of consumption in the family; and that the ordinary treatment in such cases failed to arrest the process. The portion of the iris removed was examined by Dr. Prudden, who failed to find anything to make it certain that the disease was tubercular in character.

A PERSONAL EXPERIENCE WITH PRISMATIC GLASSES.

BY S. F. MC FARLAND, M.D.,
OXFORD, N. Y.

OPINIONS are so various in regard to the efficiency of prismatic glasses in correcting or alleviating the distressing annoyances resulting from muscular paresis, that a brief statement of a long personal experience in the use of them may perhaps be admissible.

During my boyhood, I had a slight divergence, occurring and disappearing at times. Although seldom sufficient to attract attention. Still I had the full use of my eyes, could judge of distances as well as others, and was even expert in many of the sports of youth requiring binocular vision. I had no inconvenience during my studies, always enjoying the greatest comfort during the most severe and protracted application.

During the autumn of 1862 I contracted a typho-malarial fever in the army, on recovering from which I found that I had lost the full and comfortable use of my eyes, which continued with the usual pain and annoyances attending a futile effort to use both eyes in conjunction, and I was compelled to discontinue reading almost entirely, until finally in January, 1866, I consulted Dr. H. D. Noyes.

He gave me plane prisms of 7° each, bases in, for distance, and 8° each with + 36 S. for reading. At this time I had been nearly three years unable to obtain binocular vision *even for a moment*, and when once more I saw the beautiful landscape spread out in its true perspective, I was delighted. I have never discontinued them. They have been varied from time to time, endeavoring to obtain the best results, but always adhering to the prisms.

You may ask if I suffer no inconvenience? I do. Very great inconvenience, and cannot maintain *continued* binocular vision, but I *can obtain*, and *retain* it long enough for an iridectomy or an extraction, and even during very protracted operations, although at the expense of pain and a distressing lassitude following the effort. Without the prisms I could not do those things, as slight differences in distance would not be appreciable. At present I wear bifocal sphero-prismatic glasses, with the division one-third the width from below, instead of in the middle, and at an angle of 15° below the horizontal, thus rendering the division as nearly invisible as possible when looking through the lower portion in reading. The only inconveniences noticed were chromatism and spherical aberration, both of which disappeared after wearing the glasses a few weeks.

I have been told by able ophthalmologists that prisms were of no use to me, that they did not afford me binocular vision, and might as well be dispensed with. But after an experience of seventeen and one-half years, I consider "half a loaf better than no bread," and propose to continue their use. You may say that patients do not accept them. Neither do they cylindric glasses in many instances, although they increase the sight many fold. Patients are more likely to recognize the inconveniences than the advantages of spectacles, and do not always appreciate changes of moderate degree.

When I commenced wearing prisms it required 14° to enable me to use both eyes in conjunction. I can now do so without any aid, the prisms seeming to encourage the interni rather than proving detrimental to their functions. With the bifocal sphero-prismatic glasses I am able to do all my office work without changing, and with a reasonable amount of comfort.

REMARKS.

DR. WEBSTER asked why not have the external rectus cut.

DR. McFARLAND said he had only proposed to consider the practicability of prismatic glasses.

DR. MCKAY had a case present itself to him in September, 1878, occurring in a music teacher who had double vision; he stood directly in front of his class, and without moving his head made extreme excursions with his eyes to the right and to the left, and in this way weakened the external recti. Dr. McKay ordered 1 prisms with bases externally (for distance only), which the patient continues to wear with comfort. Dr. McKay further stated, that when he had his case under charge he had previously read and studied closely Dr. Noyes' paper on asthenopia with reference to the use of prismatic glasses, and found the observations very comforting and beneficial at that time.

ON THE APPARENT CURVATURE OF SURFACE PRODUCED BY PRISMS.

(With Woodcuts.)

BY O. F. WADSWORTH, M.D.,

BOSTON, MASS.

IT is a familiar phenomenon that a plane surface appears convex when looked at through prisms placed before the eyes with the bases inward, while the same surface appears concave if the prisms be arranged with the bases outward. The phenomenon may be explained as follows:

Let the curved lines R and L (Fig. 1) represent the retinas of the two eyes of an observer, k and k′ the nodal points of the eyes. Let the line C D E be parallel to a line which would connect the nodal points of the two eyes. Let C and E be points on this line from which perpendiculars to the line would pass through k and k′. Let D be equidistant from C and E. Further, let lines be drawn from C, D and E through k and k′ to meet the two retinas.

Now, suppose the eyes to be directed toward D. The image of D will fall upon the retina of each eye in the direction of the lines D k and D k′. The separation of the image of E from that of D on the right retina will be determined by the angle a = angle D k E; and the separation of the image of E from that of D on the left retina will be determined by

the angle a′ = angle D k′ E. In the same way the angles b = C k D and b′ = C k′ D will determine the separation of the images of C from those of D on the two retinas.

From the construction of the triangles D k E and C k D it is evident that the angle D k E = a is greater than the angle C k D = b. It is also evident that the angle C k′ D = b′ is greater than the angle D k′ E = a′. Therefore, the image of E in the right eye will fall on a point of the retina farther from the image of D than will be the case in the left eye. As to the image of C the reverse will be the case.

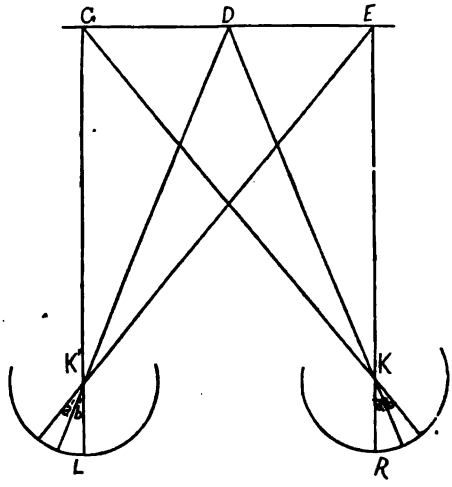


FIG. 1.

Moreover, the ratio between the angles a and b, between a′ and b′, and hence between the distances of the images of E and of C from that of D in each eye, is always the same, whatever may be the distance of the line C D E from the eyes. Thus, if the distance of this line from the eyes be doubled the angle D k E will be one-half as great; the angle C k E will also be one-half as great as before, and hence the angle C k D will be one-half its former size.

This is the condition with the unarmed eye.

If now, the position of the eyes and of the line C D E re-

maining the same, prisms with the bases inward be placed before the eyes, the rays of light coming from the points C, D and E are, on passing through the prisms, deflected toward the nose. But the rays coming from the different points are not deflected equally. The greater the angle of incidence of the ray the greater will be the deflection. Construction shows also that the increase in the angle of deflection is proportionally greater the greater is the angle of incidence. For instance, if three rays fall on a prism with angles of incidence respectively of 10°, 20°, and 30°, the difference in the amount

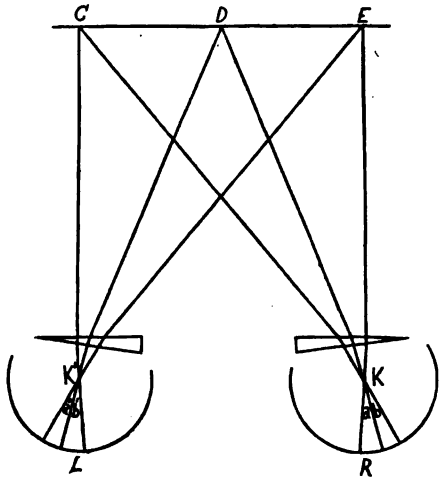


FIG. 2.

of deflection of the rays incident at 20° and at 30° will be greater than the difference in the amount of deflection of the rays incident at 10° and at 20°.

The effect of the prisms is, then, to change the angles which determine the amount of separation on the retinas of the images of C and E from those of D. These angles all become smaller. But not only do the angles become smaller under the influence of the prisms, there is also a change in the ratio of the angles to each other in each eye. Thus comparing Figs. 1 and 2, angle β does not bear the same relation

to angle α as angle b does to angle a, but is proportionally smaller. So α' is proportionally smaller than β' as compared with a′ and b′.

And this change in the ratio of the angles, or, in other words, of the proportionate separation of the images, is the cause of the appearance of convexity given by the prisms to the surface looked at. For precisely this change in the ratio of the angles occurs when we look at a convex instead of a plane surface.

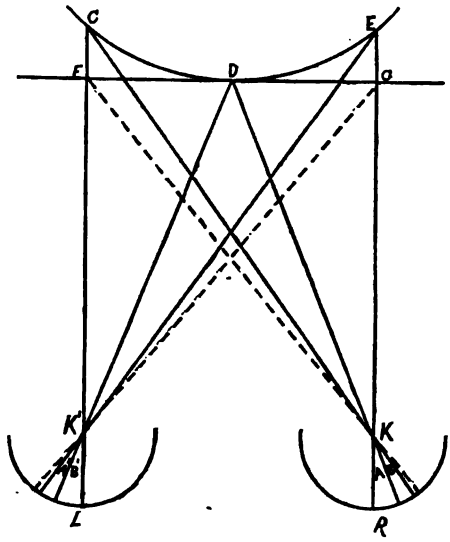


FIG. 3.

This will be readily seen from Fig. 3. Here the unarmed eyes look at the convex surface C D E, the distance of D from the eyes being the same as in the other figures. Angle D k E = A is evidently the same as angle D k E = a in Fig. 1. Angle F k D is evidently the same as angle C k D = b in Fig. 1, and, therefore, angle C k D = B in Fig. 3 is less than angle C k D = b in Fig. 1. We have then here angle B smaller in proportion to angle A than angle b is to angle a, just as, when prisms were used in looking at a plane surface, we found angle β smaller in proportion to angle α, than angle b is to

angle a. The same holds good, of course, as to angles A′ and B′.

So far, strictly speaking, it has only been demonstrated that a line in the surface looked at, running from side to side and situated in the visual plane, must appear convex when seen through the prisms.

The same reasoning, however, applies to all other lines of the surface which run parallel to the visual plane, and thus the whole surface should appear curved from side to side.

But the surface appears curved from above downward as well as from side to side. Suppose the surface to be perpendicular to the visual plane, and to be made up of a series of lines parallel to that plane. Each such line must appear convex forward, but its apparent convexity will be less and less the farther it is removed, upward or downward, from the visual plane. For the farther it is from this plane the greater will be its distance from the eyes, and the less will be the angle which the rays starting from its different points make with the prisms. Hence the deflection of the rays and the consequent change in the ratio of the angles which determine the separation of the images of its different points on the retinas will be less.

A CASE OF SYMPATHETIC NEURO-RETINITIS.

BY JAMES A. SPALDING, M.D.,

PORTLAND, ME.

THE able works of Mauthner[1] and Knies[2] contain brief mention of nearly all those cases of sympathetic retinitis or neuro-retinitis which, up to the time of their publication (1879–1881), had appeared in various ophthalmological and medical journals. Mauthner analyzes several cases in his usual satisfactory manner, and comes to the conclusion that owing to the impossibility of obtaining a good view of the interior of the eye during the uveal inflammation, many more cases of retinitis are sympathetic than those in which clear and unmistakable evidence of the fact can be obtained. At the same time, he thinks that we should not forget to pay proper attention to the assertion made by Schnabel,[3] that the common form of iritis is frequently complicated with diffuse retinitis.[4] We shall not, then, be led astray by the simultaneous appearance of both retinitis and iritis in an eye after its fellow organ has been in any way injured. If Schnabel's observations and those of other oculists are correct, it is plain that most of the cases of assumed sympathetic

[1] Sympathetic Diseases of the Eye, pp. 86 et seq. English translation.

[2] Festschrift zür Ehre, etc. Professor Horner: Ueber Sympathische Augenerkrankung. 1881.

[3] Knapp's Archives, vol. v., p. 159.

[4] Mr. C—— has been under my care at intervals during the last four years. In all, he has had eight attacks of iritis, two of the right eye and six of the left. During an attack of iritis in the left eye, six years ago, he contracted a broad adhesion, which may account for the frequent repetition of the disease in this eye. All of these attacks have been marked by diffuse retinitis in the most exquisite form. At the same time there have been changes in the field of vision, and considerable diminution of vision. This phenomenon has always been observed at a time when the iritis was retrograding.

retinitis or neuro-retinitis must be laid aside as not proven, or as carelessly observed and too hastily reported.

Knies (loc. cit., p. 63) evidently thinks that most of the so-called cases of "*sympathetic*" neuro-retinitis are widely open to criticism. The so-called rare forms of sympathetic disease are either accidental combinations (an affection of the one eye while the other was phthisical) or they are to be arrayed among those symptoms which merely indicate sympathetic irritation. This author mentions seventeen cases which were accessible to him in literary form, and asserts that in ten at least the neuritis was associated with choroiditis and cyclitis. In other words, the neuritis was simply a co-ordinate symptom of the common type of sympathetic irido-choroiditis, and terminated in precisely the same manner as the latter disease. In two other cases the data, according to Knies, were insufficient, in a third the sympathetic nature of the neuritis was far from being proved, while two others, which were not influenced in the least by the enucleation of the injured eye, yielded promptly to a course of inunction. Knies consequently concludes that sympathetic ophthalmia always appears in the form of plastic or serous irido-choroiditis.

In recent literature (1882–83) I find several cases of sympathetic ophthalmia, in which brief mention is made of retinitis or neuro-retinitis, but iritis or irido-choroiditis has always closed the scene.

These views of Mauthner and Knies especially are so diametrically opposed that it seems desirable to publish, and thus to offer to careful criticism, every case of apparent sympathetic inflammation of the retina and optic nerve (either alone or conjoined). Above all does this appear necessary when we have, as at present, to offer one in which, so far as accurate and repeated examinations have availed, the retina and optic papilla of one eye underwent inflammation after an injury to its mate, while at no time, from the beginning of the case, were there ever any visible signs of inflammation of any portion of the uveal tract.

Mrs. A—— is a Danish woman, about fifty-six years of age,

healthy in every respect. She has never had any trouble with her eyes previous to the accident which we are about to discuss. She has for some time worn convex 16 (+2.5 D) for reading, and with these glasses has been enabled to read, at the proper distance, the type in a Danish Testament corresponding in size with Snellen 1½. Although she cannot speak English, she is surrounded by a family of intelligent daughters, from whom as interpreters I have gathered her story. She recollects that both eyes used to be alike, for she had often in the past covered one eye at a time, so as to test each one separately, and found that she could see equally well with both. She has had several children, the youngest now about thirteen. She has never miscarried, and has never had any signs of syphilis. These points I have mentioned lest the neuro-retinitis, later observed, be attributed by some to latent or recently acquired syphilis.

On January 6, 1883, the patient, who lives in the country, a few miles from Portland, was about to milk a cow, when the animal, as so frequently happens, tossed up its head, hit the patient's right eye with one of the horns, and rendered it at once and forever totally blind. The patient saw a flash of light, and then the sight was gone. A physician was called, or at least was asked to give advice in the case. He directed the application of simple cold-water dressings. For some reason or other, whether owing to the distance at which the patient lived, or to the bad condition of the country roads, the physician did not see the injured eye at the time, so that we do not know its condition after the accident.

The patient dragged along several weeks with severe pain in the right forehead and temple, when, without warning, on the thirty-fifth day after the injury, the sight of the left eye began to be affected. Familiar objects about the house gradually grew dim, and by the end of a week or ten days, without any pain in this eye, the patient's vision diminished so extensively that she had to be led about. The same physician was again called, and, now alarmed by the reports of her children, he made a personal call upon the patient. He recognized the case as one of sympathetic ophthalmia, and has

since told me that the patient was at that time blind in both eyes. He had no ophthalmoscope, but, noticing as he thought, that the left pupil was small, he ordered a solution of atropia (0.12 to 32.00), which dilated the pupil to a moderate degree; *i.e.*, it was not dilated to its whole extent, but was round and did not appear to be adherent at any point of its circumference. The globe was not reddened in the least, nor was it painful. The sight was not at all improved by the use of the atropia, nor did it change at all during the following week. Finally, however, there came a change for the better; the mist before the patient's sight decreased in thickness, as she expressed herself, and she could slowly find her way about the house. The pain in the right side of the head was still very severe, and there was a great deal of sleeplessness. The case went on without any further substantial change for the better till March 28th, eleven weeks from the time of the injury to the right eye. At this time the patient, much reduced in her bodily health by loss of sleep and long-continued pain in the right eye and its neighborhood, and in great dread lest her sight should never be restored (although it was better than when at its worst) was brought to me for consultation.

Present State.—The patient is naturally a robust and healthy woman of fifty-six years, but is now much reduced in health by her long sufferings. She complains of pain in the right temple, and also of deep-seated pain in the right orbit. The right globe is atrophied, the cornea is invisible, its place being occupied by a long cicatrix extending diametrically across the former position of the cornea and infringing upon the ciliary region at both extremities. A band of connective tissue unites the globe to the upper eyelid. The latter also exhibits a cicatrix just as if it had been crushed by the cow's horn. The globe is very sensitive to the touch, but careful testing does not awaken a symmetrically sensitive spot in the other eyeball.

Left Eye.—The lids, conjunctiva, cornea, and anterior chamber are normal. The pupil is dilated to its maximum extent by the atropia solution, which had been used for the

last time about two days before. There is no trace of any adhesion upon the capsule of the lens; no remains of uveal pigment, as would probably have been the case had there ever been any iritis. The refractive media are transparent; there is no trace of vitreous opacities, even by using the strong convex glasses of the refracting ophthalmoscope. In the retina and optic papilla, however, we discover the typical appearances of neuro-retinitis. The edges of the disk are discolored, somewhat hazy, and raised above the level of the surrounding retina. Just at the margin of the disk the veins of the retina are enormously swollen and tortuous, the upper one rising considerably above the level of the disk in two or three corkscrew-like twists, just as we occasionally see them described in cases of neoplastic formation of vessels in the vitreous. The lower vein does not show this peculiarity. After leaving the papilla, both the arteries and the veins of the retina pass off in a congested and tortuous condition to about one-half the distance toward the periphery of the retina, where they then resume their natural appearance. The retina is likewise infiltrated over about the same region. I could not discover any change in the choroid coat. The patient is so apathetic from her bodily sufferings that it is impossible to discover the state of the field of vision. Refraction emmetropic. Vision (probably affected to some extent by the action of the atropia), fingers at three or four feet.

March 30th.—Contrary to the opinion expressed by Mauthner, who "would not like to enucleate in a case of sympathetic neuro-retinitis," the right eye was enucleated to relieve the pain from which the patient was suffering. The operation was followed by excessive hemorrhage, which could not be checked by pressure or hot water, and only ceased after ligature of one artery deep in the orbit, and of a second which appeared to spring from the band of connective-tissue uniting the globe and upper eyelid. The case now proceeded favorably, and the patient was sent home in ten days with the vacant orbit in a promising condition. Owing to my desire to see what influence the enucleation of

its fellow would have upon the better eye, I abstained from all medical treatment. The result appeared to justify my opinion of the truly sympathetic nature of the neuro-retinitis, for sight gradually returned to the remaining eye. The pain in the head disappeared with considerable rapidity.

July 14, 1883.—I saw the patient again, and examined her with the ophthalmoscope. Left eye normal; pupil active; media transparent; retina and optic papilla normal; the only abnormity consists in the presence of slight tortuosity of the same vein which was previously mentioned as projecting into the vitreous. Vision $\frac{20}{30}$, and Snellen $1\frac{1}{2}$ with ease, with convex 16 (2.5 D).

The right orbit still discharges a moderate amount of secretion. There is no sensitiveness to touch in the entire region.

I regret to report the loss of the enucleated eye. While cleaning my instruments after the operation, the eye, which had been carefully laid aside, with a warning to the people not to touch it, was swept away with the soiled cotton and sponges, thrown into a bucket, and dumped into the water-closet.

I am inclined to think that we should have discovered that the optic nerve had been directly crushed at the time of the injury by the cow's horn.

The presence of this neuro-retinitis with total loss of sight in an eye, five weeks after an injury to the other, and without any other visible or possible cause, such as idiopathic iritis, syphilis, cerebral lesion, etc., indicates the sympathetic nature of the disease. It is impossible to associate this condition with a sympathetic iritis which might have flourished during the interval of February 20th to March 28th, for such an inflammation would not have disappeared under the sole influence of so weak a solution of atropia, and that only occasionally employed. Nor would an iritis of so extensive development as to render the patient blind have disappeared under any treatment, in so short a period, without leaving its traces behind, in the form of adhesions, pigment on the capsule of the lens, or ciliary injection. Furthermore, the ab-

sence of all pain and injection in the left eye was emphasized by the patient and physician. May there not have been a serous iritis which would account for all this condition in the left eye? I think not; for according to my experience, this form of iritis never reduces vision to so low a degree, nor have I ever known its traces to disappear for months, even under the most favorable influences and active treatment at the hands of myself as well as of other more noted ophthalmic surgeons.

LITERATURE.

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V. GRAEFE: Two Cases of Sympathetic Chorio-retinitis. His Archives, vol. xii., part 2, p. 149.

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WOLFE: A Case of Sympathetic Neuro-retinitis. Medical Times and Gazette, vol. lii., p. 59.

HERTER: Distinct Neuro-retinitis in the Course of a Sympathetic Irido-choroiditis. Charité Annalen, 1877.

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HARLAN: Sympathetic Neuro-retinitis. American Journal of the Medical Sciences, lxxvii., p. 303.

GOSSELIN: Chorio-retinitis. Journ. d'Ophth., vol. i., p. 9.

HUGO MÜLLER: Peri-papillitis. Inaug. Dissertation, Greifswald.

HIRSCHBERG: Excessive Swelling of the Papilla in the Enucleated Eye. Arch. f. Ophth., vol. xxii., part 4, p. 136.

HIRSCHBERG: Fresh Sympathetic Retinitis. Klinische Beobachtungen, 1874. The above are quoted from Knies, loc. cit., p. 62, note.

GALEZOWSKY: Neuro-retinitis after an Injury to the Other Eye. Recueil d'Ophthal., November, 1880.

NETTLESHIP: Sympathetic Ophthalmia after Enucleation of the Globe. (The sympathetic affection appeared as neuro-retinitis in four out of nine cases.) British Medical Journal, April 17, 1880.

BENSON (Ophthalmic Review, May, 1883) and W. C. AYRES (Knapp's Archives, vol. x., p. 294) both draw attention to the incipiency of sympathetic ophthalmia with symptoms of neuro-retinitis. It appears, however, that in their cases iritis, vitreous opacities, and irido-choroiditis supervened and destroyed vision.

LEBER (Centralblatt f. Augenheilk., 1882, p. 409) and BECKER (Ibid., p. 508) mention similar cases.

All other cases not herein directly quoted may be found in Mauthner (loc. cit., p. 86 et seq.).

REMARKS.

DR. WEBSTER said he had reported two cases of sympathetic neuro-retinitis where he enucleated the eye causing the sympathetic trouble, and with excellent results, the neuro-retinitis subsiding and the eye recovering with much better vision than it had before the operation was performed. He thought also that Mauthner is wrong in saying that enucleation should not be performed where there is serous iritis.

DR. PROUT said, in reference to hemorrhage in Dr. Spalding's case, that he had three times had troublesome hemorrhage after enucleation, which external pressure, cold (ice in the orbit), heat (by means of hot water externally applied) had failed to arrest, but which had been completely controlled by using the index finger as a tampon. He thought this much easier and safer than the use of a ligature could possibly be. His method is to pass the finger deeply into the orbit and to hold it there with pressure until the bleeding ceases. If on removal blood still flows the finger must be replaced, etc. The principal inconvenience is the delay, which in one case was of nearly two hours and a half duration, with considerable fatigue as a result. Its advantage over other methods is that when the hemorrhage is arrested there is nothing mechanical or chemical left in the orbit that the surgeon must remove, or that can interfere with the healing process and so impair the subsequent mobility of an artificial eye.

DR. MITTENDORF said that he had not had the slightest difficulty after enucleation since he had applied sponge pressure; he used it as a continuous dressing in these cases immediately after the eye is enucleated. He first allows the lids to assume their normal position and then places upon them a large, soft, moist sponge, and secures it firmly in position with a flannel bandage; this the patient is allowed to wear for twenty-four hours, when it is changed and the sponge is worn for the next twenty-four hours. Since he had adopted this plan he had not seen the slightest infiltration of the lids, or any reaction in the orbital tissues. He had employed the suture, but thought that by maintaining pressure consecutively for forty-eight hours a much better adaptation of the conjunctiva and muscles is obtained than by resorting to sutures or any other procedure.

DR. SCHELL referred to a case which occurred in his practice recently. It was in the person of a German lad, fifteen years of age, employed as a machinist, who had been struck in the eye by a particle of iron, producing an injury at the sclero-corneal junction. The fragment passed entirely into the globe and its extreme apex only could be seen projecting from behind the iris into the pupil. Dr. Schell succeeded in removing the fragment through the wound by means of a magnet. The sight at that time was ability to count fingers at two or three feet. The capsule of the lens was becoming opaque. The eye was protected from light and kept at rest and the patient recovered with vision of $\frac{20}{100}$ in the course of two months after the operation. During this time, however, the sight of the other eye had diminished and there were well-marked symptoms of neuro-retinitis. Heurteloup's leech was applied to the temple of the sympathizing eye, mercurial inunctions were used, with iodide of potassium internally, and the final result was that vision was increased to $\frac{20}{40}$ from $\frac{20}{100}$ to which it had fallen. There was no neuro-retinitis in the injured eye but only in its fellow, so far as could be seen through a cloudy capsule, by the ophthalmoscope.

DR. THEOBALD asked Dr. Spalding whether he thought in his case the neuro-retinitis in the second eye developed by direct transmission through the optic nerve.

DR. SPALDING replied that he thought the blood-vessels must have something to do with transmission; he did not think that the transmission was through the optic nerve under any circumstances.

DR. THEOBALD said he asked the question because several years ago he had a case under observation in which one eye was burned with aqua-ammonia, and very severe and obstinate corneal inflammation was set up, but no deeper inflammation ensued, if some choroidal congestion was excepted. In the other eye, however, a very marked congestion of the optic nerve developed, with great indistinctness of outline, and with slight cloudiness of the surrounding retina. The first eye was not enucleated, and after a long time the irritation in the opposite eye subsided and vision improved, although the patient complained somewhat. He did not think in this case the inflammation had extended along the optic nerve, but considered that the neuro-retinitis in the second eye was the result of reflected ciliary irritation, and that the localization of the inflammation in the neighborhood of the optic disk pointed especially to the influence of the *short* ciliary nerves, which enter the eyeball around the optic nerve. A circumscribed choroido-retinitis having developed at the

posterior pole of the eye, hyperæmia of the disk, and perhaps neuritis, would soon follow, owing to the free anastomosis which exists between the vessels of the disk and those of the surrounding choroid. He was not disposed to accept the views recently advanced regarding the origin of sympathetic inflammation by direct extension along the optic nerves, and thought that the cases of sympathetic neuritis which had been explained in this way might be accounted for more satisfactorily by supposing that the irritation is reflected especially through the short ciliary nerves, and that the inflammation extends from the surrounding choroid to the optic nerve in the manner suggested.

DR. MITTENDORF asked whether the intra-vaginal space of Schwalbe was examined, and the condition mentioned by Leber was noticed, namely, the presence of micrococci. He had examined and found in all cases of acute inflammation of this character immense quantities of micrococci; whereas, when no actual inflammation existed, and only a slight amount of irritation, no micrococci were found. He had not seen an eye with sympathetic inflammation recover perfect vision.

DR. SPALDING replied that the eye was not examined in the manner indicated, and that after it was enucleated the ball was lost.

DR. WILLIAMS said, with regard to the question of hemorrhage, that he had never had any difficulty in arresting it by means of the sponge-tent. He could not see how it was possible for hemorrhage to continue after the orbit was properly plugged in that way. But, after adopting the circular suture of Bowman, he did not know that he had had a case where it was necessary to apply the sponge-tent. He could not say that it would be impossible for hemorrhage to come on and force its way between the lips of the wound about the sutures; but he had not had it occur, and he thought it was one of the means of making pressure, and that it would offer considerable resistance to hemorrhage.

In answer to a question by DR. PROUT, viz.: How does the patient like it when the sponge-tent is removed?

DR. WILLIAMS said the patient does not like it at all, but the pain is but momentary. The only objection to the sponge-tent would be that secondary hemorrhage might come on when or soon after it was removed, in which case it must be temporarily reapplied. Of course, the removal of the sponge-tent is painful, but he takes a large pair of arterial forceps and extracts the sponge instantly, and in that way

reduces the amount of pain to its minimum. Twenty-four hours, he found, was sufficient time to allow it to remain.

DR. GREEN recalled a case of enucleation in which the bleeding was profuse and continuous. He first used ice-water without success, and then digital pressure, also without success. He finally took a narrow strip of linen and tamponed the orbital cavity, making external pressure with a bandage passing over the head, and the hemorrhage was checked. He allowed the tampon to remain in position twenty-four hours, at the end of which time it was removed without difficulty by a process of unravelling. The patient, he afterward learned, was the subject of the hemorrhagic diathesis.

DR. KNAPP referred to a procedure for the purpose of avoiding hemorrhage after enucleation. If we keep close to the sclerotic there will be very little hemorrhage. The greatest amount of hemorrhage occurs when the optic nerve is cut, because we are likely to get into the naturally cavernous tissue of the organ. This can be best avoided if, by pressing the speculum into the orbit, we force the eyeball to pop out, as it were. This probably well-known procedure puts the nerve upon the stretch, so that it can be more readily divided and the enucleation completed without cutting into the circular tissue of the orbit.

DR. MITTENDORF said that he did not use the sponge-tent, but simply applied a large, soft, moist sponge directly upon the closed lids.

DR. R. H. DERBY said that this was Von Graefe's schwammver band, and had been in use for many years.

THE PRESIDENT said that the suture referred to by Dr. Williams was very good, and that it assisted in securing union of the conjunctiva without adhesions. He had never had but one case of serious hemorrhage after enucleation, and that was one which required digital pressure. He had a case in which he enucleated an eyeball for a tumor which entered the antrum, and the bleeding was profuse. It was necessary then to control hemorrhage in a deep cavity, where few of the ordinary methods are applicable. In that instance he simply adopted what is known among gynecologists as the kite-tail tampon, made of pledgets of lint. When he came to evacuate the cavity he had comparatively little difficulty in removing the tampon, as the pledgets of lint came away one after the other by drawing gently upon the string.

DR. SEELY had never seen the necessity for using the conjunctival suture. Neither had he seen hemorrhage of a serious character. One of his assistants, however, applied

the sutures, and on the following day he was obliged to remove them under great difficulties. His experience had been that no wounds heal more kindly than those resulting from enucleation of the eyeball. More recently his assistants, after enucleation, have been in the habit of filling the orbit with boracic acid.

DR. BULLER thought the suture prevented the formation of button-like granulations, which sometimes occur after enucleation. With reference to hemorrhage, he had always applied a sponge compress in the manner mentioned by Dr. Mittendorf, and had not had any trouble from secondary hemorrhage.

REPORT OF THIRTY-FIVE CASES OF CATARACT EXTRACTION.

BY DAVID WEBSTER, M.D.,

NEW YORK.

I HEREWITH present, in tabular form, the records of thirty-five cataract extractions, comprising all that I have done, good and bad, from the beginning. All these operations were performed at the Manhattan Eye and Ear Hospital. Some of them will bear a fuller report than can be put into a table; I beg leave, therefore, to enter more fully into the details of some of the cases, with such cursory remarks as may seem relevant.

Case III. was that of a man who had long since lost his right eye, which was now in a state of *phthisis bulbi*. This was followed by detachment of the lower portion of his left retina, but he was still able to see to get about alone until his vision was entirely obscured by cataract. I operated upon him with the understanding that, in the most favorable event, he would see only well enough to find his way about alone. But we were disappointed in this, iritis set in, followed by closure of pupil. A subsequent iridectomy gave him a clear pupil, but no sight, and as nothing could be seen through

the pupil but darkness I concluded that the whole retina had become detached.

Case VI., a most unfortunate one in its results, was reported in detail to this Society in my paper on "Sympathetic Inflammation following Operations for Cataract," and will be found on page 21 of the "Transactions" for 1880 as "Case IV."

In Case X. the operation was without accident, the only indication of the probability of a bad result being the thinness and flaccidity of the cornea, and the inelasticity of the coats of the eye. Upon opening the eye two days after the operation the pupil was found blocked up by a whitish mass, and there was some redness of the globe, with considerable catarrhal secretion. Two days later sloughing of the cornea began at the wound. The incision was reopened with a probe, and a few drops of a straw-colored fluid escaped. Soon after the anterior chamber became filled with pus, the whole cornea sloughed, and the result was *phthisis bulbi.*

In Case XVII. while lacerating the periphery of the lens capsule, vitreous began to escape, and as the least pressure upon the eye, instead of causing the lens to present in the wound only increased the loss of vitreous, I was compelled to remove the lens with a Daviel's spoon. As the patient complained of considerable pain on the second day, the bandage was removed and a good deal of chemosis and swelling of the lids were found to exist. Twenty grains of calomel were given at once, two leeches were applied to the temple, and iced cloths were used upon the eye. On the third day it was noted that the chemosis was less, that the pain had ceased, that the iris was yellow and the pupil opaque. One-thirtieth of a grain of pilocarpine was given hypodermically. On the fourth and fifth days one-eighth of a grain of pilocarpine was in like manner administered. On the sixth day two more leeches were applied to the temple and ten grains of calomel were given. From this time on, there was gradual improvement, and the eye recovered with the iris "drawn up," causing complete closure of pupil, with normal tension and good perception of light. Two months later I per-

formed an iridectomy downward. On seizing the iris with forceps at about its middle, and making a little traction it easily broke away from its attachment in the region of the wound, and upon drawing it out and cutting it off I found I had made a narrow vertical pupil extending all the way across the eye. The eye recovered quickly from this operation, and with it the patient still sees sufficiently well to read diamond type.

Case XIX. was that of an old man with dense leucomata of both corneæ, upon both of whose eyes iridectomy had been performed by another surgeon, as he said, for the cure of his corneal ulcers. Subsequently to the healing of his corneal ulcers cataract had developed. The lens was removed without difficulty, and a subsequent needling was performed. The resulting vision, $\frac{4}{200}$, was as good as could have reasonably been expected.

Cases XX. and XXII. are the two eyes of a German woman who had suffered much from photopsiæ, and floating "black spots" and "clouds" before her eyes. An iridectomy had previously been done upon both eyes at the Homeopathic Hospital, corner of Twenty-third Street and Third Avenue. She had also been subject to severe attacks of hemicrania.

The lens was successfully extracted, without accident, from one eye on September 17, 1879, but an opaque capsule and some soft lens matter remained in the eye. She had iritis during convalescence, and the eye healed with a dense membrane and partial closure of pupil. I learned that this eye was afterward operated upon at Charity Hospital, but what the result was I do not know. I operated upon the second eye on October 1, 1879. The lens popped out very suddenly and vitreous presented at the wound, but none escaped. Panophthalmitis set in on the fourth day and destroyed the eye.

It is noted in her case that "the dense opacity on the anterior capsule was probably due to the inflammation which occurred at the time of the iridectomy, or, possibly, for which the iridectomy was performed." The history seems to show

that hers was a complicated case of cataract, and should not be brought in with uncomplicated cases to vitiate statistics.

In Case XXVIII. the patient died on the 27th day after the operation, which is a good reason, I think, for reporting the case in full. J. B——, aged sixty-five, was received into the hospital from a country poor-house, and was operated upon December 7, 1881.

Perception of light good, but projection doubtful in parts of field. Cataract of six years' duration. General health poor. Under the left eye is a peculiar growth, which seems to be cancerous or epitheliomatous in its nature. He said, however, that it had not increased in size for several years. Ether was given, and the lens was extracted through a modified Graefe's cut without much difficulty. Small membranous looking opacity still visible in pupil. A few minutes after the operation, when the nurse's attention was diverted, he suddenly tore the dressing from the eye.

December 8th.—Considerable swelling of lids. Bandage removed and iced cloths applied. Calomel, gr. xv., given, followed by saline cathartic.

December 9th.—Swelling of lids somewhat diminished.

December 11th.—Patient again unmanageable. He tore the bandage from his eyes and roamed about the building during the night. Notwithstanding this, the eye seemed to be doing well.

December 12th.—Patient again found out of bed, and wandering around the building. Administered chloral hydrate, gr. x.

December 14th.—Patient has been quiet during last few days under influence of chloral.

December 16th.—Some iritis. To have atropine applied.

December 18th.—Patient again unmanageable. Got out of bed and crawled under it.

December 31st.—An attack of dementia.

January 1, 1882.—Patient very weak; acts like one insane. Pulse weak, and signs of failure of heart.

January 3d.—Died very suddenly last night.

Autopsy the following day by Dr. T. Mitchell Prudden,

the pathologist of the hospital: "Œdema of lungs and brain; kidneys much atrophied; extensive degeneration of the arteries."

Although this patient's vision does not appear on the books I frequently tested it with my fingers, which he counted readily, and I have no doubt that had he lived his resulting vision would have been very good.

Case XXXII. was that of a prematurely old man, aged sixty, whose right eye had been the subject of a severe attack of inflammation some eight months before I saw him, leaving the upper two-thirds of the cornea covered with a dense leucoma while the lower third was quite hazy. He had mature cataract of both eyes, but was anxious to have the eye with the corneal opacity operated upon first. I accordingly extracted the cataract from this eye on September 25, 1882. The eye did well until the fourth day, when, being allowed to sit up, and groping about in the absence of an attendant, he struck it against the top of a chair-post in stooping. The next day a well-marked panophthalmitis had set in, and the result was an atrophic globe. Had this accident not occurred, the chances are that he would have recovered with sufficient sight in the eye to get about alone.

As this patient had but one eye left I thought that perhaps his chances would be better were I to do a preliminary iridectomy for him.

Accordingly ether was administered to him, on April 13, 1883, and when he seemed to be well under its influence I proceeded to operate. While the iridectomy knife was in the anterior chamber, however, the patient suddenly raised his head and at the same time contracted his orbicularis with great force. I instantly withdrew the knife from the eye, removed the fixation forceps, and took out the speculum. After more ether was given I excised the prolapsed iris. His aqueous leaked away until the fifth day, when, the wound having closed and the anterior chamber having been re-established, we found that the lens had been dislocated into the anterior chamber.

As Drs. Agnew, Pomeroy, and others, concurred with me

in the opinion that the sooner the dislocated lens was removed the better it would be for the eye, I proceeded to extract it one week after the preliminary iridectomy. As the iridectomy wound was still only partially healed I thought it would be safer to make the cut downward. This I did without difficulty, avoiding the lens, and enlarging the wound at one end with fine probe-pointed scissors. I then introduced a small, sharp hook beneath the lens and assisted it out of the eye without loss of vitreous. A very small piece of iris prolapsed and was cut off. Considerable cortical matter was left in the eye, but I thought it prudent not to meddle with it. The eye was not opened until the sixth day, but the dressing was removed daily and the lids washed with a saturated solution of boric acid. As the anterior chamber did not fill up quickly eserine was used several times, and on the tenth day the wound closed. The pupil was filled with cortical matter, which was slowly absorbed until the twenty-third day, when a considerable portion of it fell down into the bottom of the anterior chamber, and the patient suddenly saw. He improved rapidly from this time on until he was discharged on the forty-second day with vision $\frac{20}{40}$, with $+\frac{1}{2}$ s. $\frown +\frac{1}{36}$, c. ax. 180°.

Case XXVII. was interesting on account of the patient's having mucocele of both lachrymal sacs. Having seen disastrous results in several cases where a dacryocystitis had been treated by slitting up the canaliculus, and passing probes for some time before extracting the cataract, I concluded it would be better to let the tear-passage alone lest, by operating upon it, I should change a mucous into a muco-purulent discharge, and thus the more readily infect the wound. At Dr. Pomeroy's suggestion I washed the eye with a weak solution of carbolic acid immediately before operating, and on the first few occasions of opening the eye during convalescence. The eye was opened by the house surgeon several times daily, and the contents of the sac pressed out with the thumb and carefully wiped away. The recovery was unattended with inflammation.

Thirty-one different patients were operated upon, four of

them having the second eye operated upon after a short interval. Males, 20; females, 11. Total, 31.

Their ages ranged from 30 to 83.

Under 40 years of age	2
From 40 to 50 years of age	3
From 50 to 60 years of age	9
From 60 to 70 years of age	9
From 70 to 80 years of age	6
Upward of 80 years	2
	31

Twenty-eight eyes were operated upon while the patient was under ether. Of these twenty-three were successes, two partial successes, and three failures.

Seven eyes were operated upon without the use of an anæsthetic. Five of these did well, and two were failures.

The method of operating known as "von Graefe's modified" was used in all cases in which it was practicable. Where a preliminary iridectomy was done, the incision for extraction of the lens was made in the same position as in the other cases. Preliminary iridectomy was performed in six cases, four by myself, and two by another surgeon. Both the eyes of the patient who came to me with preliminary iridectomies did badly; the other four did well.

In only one case out of the whole thirty-five was there loss of vitreous. The same was the only case in which a scoop was introduced into the eye for removing the lens.

In one case there was dislocation of the lens into the anterior chamber during the preliminary iridectomy.

In one case irido-dialysis was produced during the operation, though so obscured by blood as not to be recognized until later; and in one case the iris fell before the knife, owing to premature escape of the aqueous, and was cut through.

In all these cases in which accidents occurred during the operation the eyes recovered with good sight.

In three cases the cornea was found thin and flaccid, and became wrinkled, or collapsed, on evacuation of the lens.

In eight cases there was hemorrhage from the iris imme-

diately following the iridectomy, showing an undue vascularity of that membrane, or an atheromatous condition of its blood-vessels.

In four cases a considerable quantity of soft lens matter was left in the eye.

In one case "some inflammatory reaction" was noted during recovery. This eye did well.

In four cases there was iritis. Closure of pupil resulted in three of these, and in one the result was good. In another the result was made good by an iridectomy.

Sloughing of the cornea occurred in one case, panophthalmitis in two cases, and in one case there was irido-cyclitis with sympathetic inflammation of the fellow eye.

Comparatively few secondary operations were required.

Iridectomy was performed in two cases, in both resulting in a clear pupil, but in one failing to restore sight on account of deeper disease.

Keratonyis for pupillary membranes was performed in seven cases, and was in all cases successful.

If we take the results of all the cases, complicated and uncomplicated, they will stand as follows: In 2 eyes, vision was $\frac{20}{50}$; in 3 eyes, $\frac{20}{40}$; in 6 eyes, $\frac{20}{30}$; in 8 eyes, $\frac{20}{70}$; in 3 eyes, $\frac{20}{100}$; in 4 eyes, $\frac{20}{200}$; in 1 eye, $\frac{20}{\text{Fingers}}$; in 1 eye, $\frac{4}{200}$; in 1 eye $\frac{1}{\text{Fingers}}$; in 1 eye, perception of light; in 5 eyes, 0.

I shall reckon the case which is recorded as counting fingers at twenty feet as a good result, as the patient did not know her letters; and the case of perception of light as a loss, although sight may have been restored by a subsequent operation. We will then have: successes, $27 = 77\frac{1}{7}$ per cent.; partial successes, $2 = 5\frac{5}{7}$ per cent.; failures, $6 = 17\frac{1}{7}$ per cent. I believe, however, that in justice to myself and to *cataract statistics*, I ought to exclude the two cases of extensive corneal opacity, the case of detachment of the retina, and the old German woman with vitreous, and perhaps deeper complications. The figures would then be very materially changed. We would have: successes, $27 = 90$ per cent.; partial successes, $1 = 3\frac{1}{3}$ per cent.; failures, $2 = 6\frac{2}{3}$ per cent.

No.	Age.	Sex.	General health.	Quality and duration of cataract.	Functional examination.	Method of operating; incidents; anæsthesia or not; remarks; after-treatment.	Time in Hospital.	Date of record; resulting vision.
1	56	M.	Has chronic bronchitis.	Hard.	Normal.	Graefe up. Cornea wrinkled; no accident; ether; no vomiting. Recovery smooth.	21 days.	21 days. V. = $\frac{20}{200}$, J. 2½.
2	83	M.	Good.	Hard; 2½ years.	Normal.	Graefe up. No anæsthetic; bleeding from iris obscuring lens during capsulotomy. Smooth recovery.	17 days.	4 months. V. = $\frac{20}{80}$, J. 1.
3	40	M.	Fair.	Capsule opaque and soft cortex.	Apparently normal, as tested with candle.	Detachment of lower periphery of retina had been previously seen; fellow eye lost by irido-choroiditis fifteen years before; opaque capsule and soft lens matter left in eye; ether; iritis; closure of pupil. Iridectomy ten weeks later.	18 days.	V. = 0.
4	30	F.	Good.	Soft; 4 years.	Normal.	Graefe up. Ether; vomiting. Some soft lens matter left in pupil. Keratonyxis sixteen days later.	20 days.	6 weeks. V. = $\frac{20}{80}$, J. 1.
5	51	F.	Good.	Hard; 2½ years.	Normal.	Graefe up. Ether; no accident. Recovery smooth.	21 days.	21 days. V. = $\frac{20}{70}$, J. 1.
6	30	F.	Good.	Soft; 4 years.	Normal.	Graefe up. No anæsthetic; small wound; no hard nucleus found; irido-cyclitis; sympathetic inflammation of fellow eye. (Other eye of Case 4.)	28 days.	V. = 0.
7	69	M.	Good.	Hard.	Normal.	Graefe up. Ether; no accident; recovery smooth; keratonyxis seven years later. Old phthisis bulbi of fellow eye.	22 days.	7 years. V. = $\frac{20}{70}$, J. 1.
8	55	F.	Good.	Hard; 2 years.	Normal.	Graefe up. Ether; some inflammatory reaction. Iced cloths, leeches, and anodynes used.	30 days.	3 months. V. = $\frac{20}{70}$, J. 1.
9	67	M.	Subject to inflammatory rheumatism.	Hard; 2 years.	Normal.	Graefe up. Hemorrhage from iris; cornea thin and collapsed; ether attempted but failed; some cortex left. Keratonyxis 19 days later.	33 days.	30 days. V. = $\frac{20}{200}$.
10	67	M.	Good.	Hard.	Normal.	Graefe up. Ether. Cornea flaccid; some cortical matter left in pupil; sloughing of cornea.	14 days.	V. = 0.
11	54	M.	Good.	Hard; 3 years.	Normal.	Graefe up. Ether; hemorrhage from iris. Recovery smooth.	21 days.	21 days. V. = $\frac{20}{70}$.
12	68	M.	Good.	Hard; 2 years.	Normal.	Graefe up. Ether; no vomiting; iris fell in front of knife and was cut off in making section. Recovery smooth.	24 days.	6 months. V. = $\frac{20}{40}$, J. 1.

No.	Age.	Sex.	General health.	Quality and duration of cataract.	Functional examination.	Method of operating; incidents; anæsthesia or not; remarks; after-treatment.	Time in Hospital.	Date of record; resulting vision.
13	68	M.	Good.	Hard; 2 years.	Normal.	Graefe up. Ether; no vomiting; no accident. Recovery smooth. (Other eye of Case 12.)	19 days.	19 days. V. = $\frac{20}{20}$.
14	65	F.	Good, except rheumatism.	Hard.	Normal.	Graefe up. Preliminary iridectomy 5 weeks previous. Peripheral capsulotomy; had two needlings; no anæsthetic.	27 days.	3 months. V. = $\frac{20}{70}$.
15	76	M.	Good.	Hypermature.	Normal.	Graefe up. After preliminary iridectomy 6 weeks before; peripheral capsulotomy; ether. Smooth recovery.	21 days.	10 weeks. V. = $\frac{20}{100}$, J. 1.
16	70	M.	Good.	Hard; 10 years.	Normal.	Graefe np. Peripheral capsulotomy; ether. Smooth recovery; keratonyxis 2 months later.	21 days.	13 weeks. V. = $\frac{20}{70}$.
17	50	F.	Good.	Hard; 2 years.	Normal.	Graefe up. No anæsthetic; peripheral capsulotomy; loss of vitreous, and lens removed with scoop; chemosis; closure of pupil. Iridectomy 2 months later.	24 days.	4 months. V. = $\frac{20}{40}$.
18	49	M.	Good.	Hard; 10 months.	Normal.	Graefe up. Peripheral capsulotomy; ether; keratonyxis 20 days later.	23 days.	2 months. V. = $\frac{20}{30}$, J. 1.
19	72	M.	Poor.	Hard; 6 years, extensive corneal opacity.	Projection normal.	Graefe down, cutting through periphery of iris. Ether; no vomiting; keratonyxis 3 months later. Previous iridectomy for corneal ulcer.	12 days.	1 year. V. = $\frac{4}{200}$.
20	52	F.	Subject to hemicrania.	Hard.	Floating black spots in field.	Graefe up. Preliminary iridectomy by another surgeon 4 months before. Peripheral capsulotomy; iritis, resulting in closure of pupil; ether; slight vomiting.	30 days.	V. = perception of light.
21	64	F.	Fair.	Hard; 3 years.	Normal.	Graefe up. Ether; no vomiting; peripheral capsulotomy. Local atropine poisoning during recovery.	15 days.	4 years. V. = $\frac{20}{20}$.
22	52	F.	Subject to hemicrania.	Hard.	Floating black spots and photopsiæ.	Graefe up. Preliminary iridectomy by another surgeon 5 months previously. Peripheral capsulotomy; lens popped out suddenly and vitreous presented but none escaped; panophthalmitis; no anæsthetic. (Other eye of Case 20.)	35 days.	V. = 0.
23	47	M.	Good.	Hard; 16 months.	Normal.	Graefe up. Peripheral capsulotomy; ether; slight vomiting; recovery smooth; keratonyxis 6 weeks later.	21 days.	1 year. V. = $\frac{20}{20}$.

24	38	M.	Good.	Hard.	Normal.	Graefe up. Peripheral capsulotomy; ether; chemosis third day; calomel, gr. xv., followed by magnes. sulph.; hypopyon on thirteenth day; paracentesis; eye well on 42d day.	20 days.	V. = $\frac{20}{100}$.
25	61	M.	Good.	Hard.	Normal.	Graefe up. Bleeding from iris into pupil; ether; no vomiting; peripheral capsulotomy; membrane in pupil.	21 days.	21 days. V. = $\frac{20}{200}$.
26	50	F.	Good.	Hard.	Normal.	Graefe up. Bleeding from cut iris; ether; no vomiting; after absorption of blood, irido-dialysis found.	21 days.	V. = $\frac{20}{\text{Fingers.}}$
27	54	F.	Good.	Hard.	Good field.	Graefe up. No anæsthetic; mucocele of both lachrymal sacs and stillicidium.	19 days.	19 days. V. = $\frac{20}{200}$.
28	65	M.	Poor.	Hard; 6 years.	Normal.	Graefe up. Ether acted badly; iritis; patient died on 27th day. Autopsy revealed atrophy of the kidneys.	27 days.	V. = $\frac{2}{\text{Fingers.}}$
29	53	F.	Good.	Hard.	Normal.	Graefe up. Hemorrhage into pupil from cut iris; ether. Recovery smooth.	28 days.	28 days. V. = $\frac{20}{70}$.
30	68	M.	Good.	Hard; 2 years.	Normal.	Graefe up. Ether; pupil filled wiih blood from cut iris; iritis, mild.	21 days.	4 weeks. V. = $\frac{20}{20}$.
31	81	M.	Poor.	Hard; 4 years.	Normal.	Graefe up. Hemorrhage into anterior chamber from cut iris; no anæsthetic; slight iritis.	18 days.	3 months. V. = $\frac{20}{100}$.
32	60	M.	Good, except chills.	Hard; large old corneal opacity.	Projection bad in places.	Graefe up. Ether; eye did well till fourth day when patient struck it against a chair-post in stooping; panophthalmitis.	30 days.	V. = 0.
33	70	M.	Poor.	Hard; 5 years.	Normal.	Graefe up. After preliminary iridectomy 7 weeks previously. Ether; vomiting and straining. Recovery smooth. (Other eye lost by operation 6 years before.)	21 days.	7 months. V. = $\frac{20}{20}$.
34	61	M.	Chills and fever.	Hard; 2 years.	Normal.	Lens dislocated into anterior chamber during preliminary iridectomy; removed by sharp hook one week later through downward cut, without loss of vitreous; considerable cortex left; ether. Recovery smooth. (Other eye of Case 32.)	42 days.	42 days. V. = $\frac{20}{40}$.
35	62	M.	Good.	Hard; 4 years.	Normal.	Graefe up. Ether. Recovery smooth.	18 days.	18 days. V. = $\frac{20}{70}$.

REMARKS.

DR. HEYL said that the case of sloughing cornea referred to by Dr. Webster recalled a clinical experience which is suggestive of the thought that sloughing cornea following cataract extraction may sometimes be due to diphtheritic infection, and should be treated accordingly. He had noticed in one instance that a short period, perhaps a couple of days, after a Graefe extraction inflammatory action was developed in the eye. The pupillary space became filled with a whitish mass which projected between the lips of the cut. On the lower half of the cornea a yellowish semicircle formed, perhaps, a millimetre in breadth, and distant from the limbus perhaps two millimetres. The cornea was steamy. Encircling the limbus was a girdle of conjunctiva elevated by subconjunctival infiltration. The upper lid was œdematous; there was no false membrane. The symptoms, with exception of the whitish mass blocking the pupil, correspond to what he had observed a number of times in cases of subacute conjunctival diphtheria. The semicircular infiltration of the cornea was rather peculiar, the opening of the ring corresponded with the cut. In his experience usually the corneal affection is in the form of an opaque area, which breaking down forms a deep ulcer. He had, however, once seen an opacity similar to the one above mentioned, except that instead of being a semicircle it was a complete circle. The pupillary mass must, he thought, have been a bacterial formation. In confirmation of the view that this was a case of traumatic diphtheritis, a patient in the same ward, and but a few beds distant, on whom extirpation of the orbital contents for malignant disease had been performed, was attacked by traumatic diphtheritis; also two attendants in the hospital at the same time were attacked with pharyngeal diphtheria. Another point was suggested in this connection. The secondary operations in Dr. Webster's cases had been followed by no unpleasant result. Dr. Heyl had a year ago extracted a cataract, and subsequently divided the capsule without unusual reaction, with the effect of giving the patient sight sufficient to pursue his occupation, that of a clerk. A hole of good size had been made in the capsule, surrounded, however, by a margin of thin veil-like tissue. At the solicitation of the patient he was induced to try if he could not further improve sight. After doing the best that could be done by glasses, he advised that the veil-like margin of capsule be divided. There was apparently no irritability of the eye. The extrac-

tion cut had been a little peripheral, and in one corner a prolapsed portion of iris had healed in the wound. The second division of the capsule was performed without any difficulty. On the third day after the operation cyclitis was developed, followed by total loss of sight. Whether the engagement of the iris in the corneal cut had placed the eye in a condition favorable for the development of cyclitis, whether an unsound condition of the eye previous to the extraction was the cause, or whether this was a case of traumatic inoculation is not known.

DR. STRAWBRIDGE asked, first, was ether used, and if so why; second, was atropia used in the after-treatment; third, were antiseptic dressings used in the after-treatment.

DR. WEBSTER replied that he gave ether in most of the cases, and because the patients wished it. Atropia was used in forty-eight hours after the operation in most cases, but not always. Antiseptics were only used in the case of mucocele, and there the eye was simply washed with a solution of carbolic acid.

DR. THEOBALD would like to ask Dr. Webster whether, in the case in which the patient became irrational, he noticed any connection between the instillations of atropia and the appearance of the mental aberration. He had seen one case where the use of atropia was followed by mild symptoms of dementia.

DR. WEBSTER replied that he did not think that the mental disturbance was attributable to the atropia at all, and most of the gentlemen who saw the case thought that the ether had something to do with it, as the patient had Bright's disease.

DR. CARMALT, with reference to the assumption that mental disturbance might follow the use of ether, mentioned a case in which active delirium came on the third or fourth day after the operation without ether. He believed the delirium to be mainly due to the confinement in bed in a blinded condition, in which state the patients "lose their bearings" altogether. He had not infrequently met the same thing in patients blinded by accident and put to bed immediately afterward.

THE PRESIDENT remarked, that it was well established that symptoms of dementia can be produced by atropia. He did not believe that the ether had anything to do with the development of these symptoms, and that in Dr. Webster's case the condition was more likely due to anæmia or some general condition of the patient; at all events, he did not think that the ether had anything to do with it.

NOTES ON OCULAR THERAPEUTICS.

By W. W. SEELY, M.D.,
CINCINNATI, O.

THE first point I desire to notice is in the use of the yellow oxide of mercury in external ocular troubles. Probably every one has found the use of this remedy, whether in corneal or conjunctival diseases, like calomel in the past, often attended with pain. This often-recurring fact and disadvantage led me some time ago to institute some investigations in regard to the cause or causes.

So far as regards the strength of the preparation, I have found that ten grains to the ounce of the vehicle is the best for all purposes. When I began to enquire into the mode of action of the yellow oxide I found that this preparation was regarded chemically as an insoluble substance. My theory in regard to its action at first was, copying from the supposed action of calomel, that a chemical change occurred; but finding that it was an insoluble substance, and hence inert, this explanation seemed to fail.

I took a large number of specimens, and had them analyzed, and found that all the so-called "chemically pure" preparations contained more or less bichloride, and the inference from this was that its action depended on this residuum in its manufacture.

My assistant, Dr. Caldwell, has lately been working at the subject, and is satisfied that there is a certain amount of solubility in the yellow oxide, to what degree tests have not decided.

One point seems settled—that the less bichloride a preparation contains, the less the pain produced by the salve, efficiency remaining the same.

I desire to add one more practical point in the use of the yellow oxide and vaseline, as devised by myself some years ago in conjunctival affections. Those who have used this combination have doubtless found that in cases where there is a profusion of tears the salve is so quickly washed out that little or no benefit results. In such cases I substitute eserine or the bichloride in solution to contract the blood-vessels.

The strength of the bichloride solution that seems to answer every purpose is one part to seven or eight thousand (one grain to sixteen ounces water), or about one-third the strength preventive of the growth of the bacteria of ordinary decomposition.

Such a solution, entirely painless, has often, in my hands, set aside an acute catarrhal conjunctivitis of violent type—after one to three or four thorough drenchings of the conjunctiva.

This is the strength I have used for a long time as an antiseptic in various operations.

In corneal affections I still use, as I have done for a long series of years, a four-grain solution of eserine.

I merely state this to introduce a point I regard of great practical importance. In my hands one thorough application of a four-grain solution *once a day* acts altogether better than more frequent applications, either of the same solution or that of weaker ones.

This remark applies to all classes of cases.

One point more in regard to eserine. For the reduction of intra-ocular tension eserine has for me entirely done away with paracentesis, and for so long a time and so completely that this procedure has really only an historical interest.

Everyone has met with cases of iritis in which atropine does not seem to act promptly and satisfactorily, possibly because an increased tension prevents its entrance, *or possibly because of the extreme vascularity of the iris*, which I regard as the more probable.

In such cases, instead of making paracentesis or abstracting blood, I instil once a day a few drops of a four-grain solution of eserine. In fact, the habit of instilling eserine once a day

in iritic cases has become a routine practice, the patient using the mydriatic in the ordinary manner. Iritis is the only disease in which I employ a mydriatic as the fundamental remedy.

In more than one case I have seen adhesions let go under the combined action of the myotic and mydriatic that had resisted the latter alone. In my judgment eserine is the remedy par excellence in corneal affections. In cases in which mydriasis is necessary this latter can be produced perfectly and still the specific effects of the myotic kept up. This is beautifully illustrated in suppurative inflammation after cataract operations, formerly so unsuccessfully treated by heat and atropine.

REMARKS.

DR. MCKAY said that some years ago he became interested in an article written by Dr. Seely, and published in one of the Western journals, in which the use of the yellow oxide of mercury was spoken of very highly. Since that time he had resorted to its use in nearly all cases in which an astringent has been considered desirable in conjunctival troubles, and so far had been very favorably impressed with its effects.

DR. GRUENING said, with reference to the alternate use of mydriatics and myotics for breaking up adhesions, that the method was not quite new. He had seen it resorted to in Paris in 1868.

With regard to eserine in iritis that was something entirely new, and he should regard it as a most dangerous practice. He could produce iritis with eserine at any time in a healthy eye, and also in a diseased eye. His experience had been that iritis was aggravated by eserine. He had used eserine after cataract operations and had set up iritis. In cases of suppurative keratitis he had ceased to employ eserine completely.

DR. KNAPP said, with reference to the use of eserine and atropine, that eserine is apt to produce iritis, and may even be injurious after iridectomy for glaucoma. But there are some forms of iritis, especially the serous variety, where the alternate use of these two remedies is of advantage. Again, in plastic iritis, when there is increase of tension which produces intense pain, the patient sometimes is considerably relieved by the instillation of a drop of eserine.

DR. SEELY said he wished to correct what seems to have been an erroneous impression. It was not the *alternate* use

of eserine of which he wished to speak; not at all. He simply spoke of the use of eserine *once* a day for the purpose of contracting the blood-vessels, so that the atropine could pass through the corneal tissue more freely. In that way he thought we were able to get up a more free dilatation of the pupil than could be done without the eserine. He had never seen a case in which eserine had produced iritis, and he had used immense quantities of it. He employed it in conjunctival troubles, always in corneal difficulties, once a day in cases of iritis which came to the dispensary, of course maintaining mydriasis by the use of atropine.

DR. KNAPP had given eserine a faithful trial in corneal inflammation since Thalberg published his observations on keratitis from inunction. He had used it in many cases, and at first thought it controlled this process, but later he had not seen that its beneficial action was in any way constant.

DR. MCKAY said that in corneal ulcers it had been his habit recently to use atropine until the inflammation had subsided, and then he used eserine with very good effects, and after such use of eserine he could concur quite fully in what Dr. Seely had said about that drug.

THE TREATMENT OF DETACHMENT OF THE RETINA.

BY W. F. MITTENDORF, M.D.,

NEW YORK.

DURING the last three years I have been called upon to treat several cases of very extensive detachment of the retina, occurring in patients that had only one useful eye, the other one being entirely blind or absent.

The good results obtained by the treatment of these eyes, which were practically blind when I saw them first, encourages me to report them to-day. Although no new remedy or method had been used, it is the combination of the different plans devised for the treatment of this affection and the mode of administering the remedies that has led to the success. On account of the uncertainty of operative measures these had not been resorted to.

Before giving a history of these patients I must say that it is evident that a detachment of the retina may be due to different causes. Those cases which are due to contraction or atrophy of the vitreous humor, to which Professor Leber, of Göttingen, has lately called attention, and which are often accompanied by a rupture of the retina, would perhaps resist all means of treatment, but those resulting from serous effusion, due to irritation of the choroid, as we have it occur so often in highly myopic eyes or even where a choroidal hemorrhage, traumatic as well as idiopathic, is the cause, an attempt should always be made to save the eye, especially if this is the only one left to the patient.

The object of the treatment must be in the first place to keep the eye as free as possible from all irritating influences, and this is done best by closing both eyes by means of a bandage, or by putting the patient in a dark room. Second, to keep the eye quiet and avoid all accommodative efforts which would naturally affect the choroid. For this purpose the eye must be kept under the influence of a mydriatic—atropine for instance. No myotics should be used locally, and my experience agrees with that of Dr. Knapp, who mentioned, in the discussion that followed the report of Dr. Green's case two years ago, that he had never seen any good effect of the local use of pilocarpine or eserine in these cases. These remedies would naturally put the choroid more or less on a stretch. Another indication in the treatment of a detachment of the retina is to place the absorbents in the most favorable condition. This is accomplished by means of a pressure bandage, and I have found the elastic pressure procured by means of the rubber bandage, to be of the greatest help; the one usually employed for surgical purposes will answer the purpose, or an ordinary flannel bandage may be arranged in such a way as to have one turn to go around the head, another over the chin connecting with the first behind the ears, and a connecting piece made of strong elastic material to go over the eye. In this manner the bandage will be tolerated by the patient for a long time, and enough pressure can be exerted to be of benefit.

Another indication is to hasten the absorption of the effused fluid, if this be the cause of the detachment. This can be accomplished by the use of jaborandi or pilocarpine, which, by increasing the excretion of fluids from the body, will lead to a speedy absorption of the sub-retinal effusion. The remedy is conveniently applied, and has frequently been used for this very same purpose in the shape of hypodermic injections; but the effect of even a liberal dose of it, administered in this manner, will affect the system only for a short time, and if given in larger doses it may affect the patient so seriously that its use may have to be discontinued. I have given, therefore, an injection of pilocarpine $\frac{1}{8}$ to $\frac{1}{6}$ of a grain early in the morning, and have kept up the diaphoresis, which sets in very soon, by the use of an infusion of the jaborandi leaves. Forty grains to one drachm to twelve ounces of water will make a pretty strong infusion, which, if administered in wine-glass doses during the afternoon and evening, will keep the patient in a state of moderately profuse perspiration during the entire twenty-four hours; this treatment is to be kept up for three or four weeks. I have not seen a single case in which this remedy, administered in the just mentioned way, had to be discontinued on account of unpleasant symptoms; and although the patient would feel uncomfortable in the beginning, the diaphoresis would go on more comfortably after a short time. If the detachment complicates a specific choroiditis, or if it follows a serous iritis demanding a specific treatment, this may be used at the same time with the other remedies mentioned. In these cases it will not be necessary to push the pilocarpine to a great extent, and the disease is apt to yield, as a rule, sooner than in other cases.

The following cases occurred partly in my private practice and partly in my service at the New York Eye and Ear Infirmary, and will serve to illustrate the severity of the affection:

CASE I.—Mr. F. W. S——, a German, forty-nine years of age, and married, was brought to my office June 3, 1881, with the following history: Patient is near-sighted, and has been so as long as he can remember; he comes from a near-

sighted family. He had not used glasses until ten years ago. About twenty years ago he discovered, quite accidentally, that his left eye was blind. It is now quite amaurotic, probably in consequence of a complicated cataract. The lens is very white and hard, and there are numerous posterior synechiæ; the iris is atrophic. This eye is now in a perfectly quiet state, is not tender on pressure, is not congested, and has not given any trouble for many years. The right eye has been near-sighted, and patient has been using a —6 for nearly ten years. This glass did not correct the entire amount of the myopia; but Mr. S. has been able to attend to his business as a grocer without any difficulty, nor did he notice anything unusual about the eye up to a few days ago. Two nights before his first visit to my office he had a very difficult passage; he was suffering from hemorrhoidal trouble. The next morning he noticed dark objects floating up and down before his eye. Patient says they appear like angels going up and down in a dense cloud. There is a large central scotoma. V. = fingers in six inches at temporal side.

The ophthalmoscope reveals a large posterior staphyloma; nerve red and muddy. Vitreous humor somewhat cloudy, due to small floating opacities. The retina is almost entirely detached, including the region of the yellow spot. The detachment is most marked and quite elevated at the lower and outer part. The nasal portion is not near so much affected, presenting no wavy appearance, and patient has some vision at this side. The patient was seen by Dr. Derby in consultation, who agreed with me in the diagnosis of total detachment of the retina.

The patient was put to bed. Atropine had been applied previously for diagnostic purposes; an elastic pressure bandage was applied and an injection of one-fourth of a grain of pilocarpine was used in the morning. This produced some slightly unpleasant, suffocating sensation, which was, however, soon followed by profuse perspiration which lasted for several hours. The patient dreaded the hypodermic injection, which had been made in the temporal region, and I ordered an infusion of jaborandi, about fifteen grains to a wineglassful of

water, one to be given at 6 and one at 11 P.M. This started the perspiration again in a short time without any unpleasant feeling, and continued during the entire night.

The next morning at 9 A.M. patient was feeling perfectly well; temperature and pulse normal; skin slightly moist. On removing the bandage the patient, who had never seen me before, tells me that he can see that I have got a beard. The same treatment, a hypodermic injection of one-sixth of a grain of pilocarpine, applied to the temporal region, which is followed by three fifteen-grain doses of jaborandi, is continued. On the third morning the patient can see the gas-fixtures in the middle of the room, and after a continuation of the treatment for three weeks the patient is able to see with a $-6\frac{20}{cc}$. The field is almost perfect; uncertain in an upper and inner direction. Fundus is still slightly blurred; red reflex not perfect; retina a little pale, and some vessels still a little raised. Patient complains that there is still a little haze over the eyes. Ordered for several days two doses of fifteen grains of jaborandi in infusion and rest. Patient's vision clears up somewhat but fundus of eye remains about the same. Six months later vision the same; one year later vision almost $\frac{20}{c}$; two years later, $\frac{20}{cc}$.

The second case is that of a Mr. J. E. McC——, sixty years of age, American, living in Geneseo, N. Y. The patient lost his left eye some twenty years ago; stump is in good condition, not painful. Has always enjoyed good sight in the right eye up to October, 1882.

Cutting wood one day, a piece of it flew against his eye, causing severe contusion of the lids, and giving him a black eye, as he calls it. This disappeared in a few weeks. Four weeks after the first injury, while working in a field on his farm, he felt a dimness come over his eye, not accompanied by any pain. This grew dark so rapidly that he could hardly find his way home. A week later he went to Rochester for advice, but was told that he had a detachment of the retina, and that nothing could be done for him.

He was brought to me by a friend of his, a New York physician, about six months after the attack. Patient is a

strong-looking man for his age, but is greatly depressed on account of his sad condition; he has only perception of light, and this is not good in all parts, somewhat better in a downward direction. On examination, the entire retina, with the exception of a small triangular section in the upper and nasal portion, is detached; the optic nerve appears slightly blurred and much congested. Patient was at first treated by hypodermic injections of pilocarpine alone, beginning with one-eighth of a grain, which was increased to one-third of a grain. This would be followed by slight febrile symptoms and profuse perspiration, lasting for several hours. After continuing this treatment for four or five days, no perceptible improvement could be noticed. A pressure bandage was now applied, the injection of pilocarpine, followed by the administration of the infusion of jaborandi, representing ten grains of the leaves for each dose, which was given four or five times during the day, so as to keep up a constant sweating. Atropine and position on back were continued, and within three days the patient was able to eat alone, a thing which he had not done for many months. After three weeks' treatment, patient has a vision of $\frac{6}{CC}$, and the field of vision was almost perfect. He was able to leave for home alone, but expects to return in the fall to see whether any greater improvement can be obtained by submitting to a similar treatment.

The next case is that of Mr. B——, German, married, and thirty-nine years of age. He complains that the sight of the right eye has been failing for some time; not only that the sight is poor ($\frac{6}{CC}$), but he sees dark objects floating up and down. He gives a history of syphilis, and upon examining the interior of the eye many vitreous opacities are seen, and several oblong bluish patches, especially along the course of the retinal vessels, are found. Some of these are decidedly elevated, but no motion can be seen in any of them when the eye is moved. Tension about normal, perhaps a little less. The other eye is slightly myopic; -20 gives a V. $= 1$. The diagnosis was specific choroiditis, and the mixed treatment was commenced at once. But little improvement could be recorded for the first few weeks. A short time after this

he was brought to the infirmary, with the history that on stooping to pick up something from the floor he noticed a cloud spreading over the good left eye, with which he barely counts fingers. The sight of the right eye has also deteriorated, so that he is now practically blind. Upon ophthalmoscopic examination an extensive retinal detachment, of the appearance of a bluish, wavy vesicle, is seen projecting far into the vitreous, and occupying especially the outer and inner quadrant of the retina; tension of this eye, = — 1.

Patient is put to bed at once, and a vigorous treatment of pilocarpine, with a pressure bandage over both eyes, is resorted to, in the same manner as reported before, with the addition of the administration of $\frac{1}{32}$ of the biniode of hydrarg. and 10 grains of iodide of potassium twice a day. Patient began soon to improve, especially in the right eye, and he had, after one week, a vision of $\frac{20}{CC}$; the left eye, however, had only a vision of $\frac{10}{CC}$, with a — 36 (the best glass), after a three weeks' course.

Further treatment was irregular, as the patient commenced to make a living as a peddler. Six months after treatment the vision is just the same as before. This spring, two years after the first stay at the hospital, the vision in the left eye is fingers at 6 inches only, and the right one has V. = $\frac{6}{CC}$. He has not used glasses, because they annoy him, and proposes to return to the hospital during the summer, in order to see whether his vision can be brought to what it was before.

These cases go to show, first, that in marked detachment of the retina the energetic use of jaborandi and pilocarpine will do good, especially if the patient can be kept under the influence of the drug during the entire day, and for a period varying between twenty and thirty days; second, that the elastic pressure bandage must be used at the same time; third, that the patient be kept on his back most of this time; and, fourth, that the use of atropia, which is employed without causing any inconvenience to the patient, should likewise not be neglected.

REMARKS.

DR. GRUENING said there was one important point which should be mentioned, and that was, how long has improvement lasted in Dr. Mittendorf's cases.

DR. MITTENDORF replied that in one case nearly two years, in another case about six months, and in the other two years.

DR. LITTLE asked what influence the plan of treatment had upon detachment of the retina from hemorrhage of the choroid or ciliary body.

DR. MITTENDORF said he had not had any experience in that direction.

DR. ANDREWS asked how long the patients were confined to bed.

DR. MITTENDORF answered that he wished to keep them in bed from twenty to thirty days.

DR. ANDREWS asked Dr. Mittendorf if he ascribed the good results to the use of pilocarpine or to the rest.

DR. MITTENDORF replied, to both.

DR. ANDREWS said that three years ago, he took nitrate of pilocarpine to the Manhattan Eye and Ear Hospital, and the house surgeon, Dr. Stowell used it hypodermically in a number of instances without any results. But Dr. Andrews thought that the failure was due to the fact that the patients were not in-door patients. He had used the remedy a few times in private practice, and in one case he had observed good results, but he ascribed them however, to the rest enjoined.

DR. SPALDING wished to say a few words with regard to the operative treatment of these cases. He saw last year in Mooren, "Fünf Lustren Ophthalmologischer Arbeit," a suggestion concerning the removal of this effusion by the use of the hypodermic syringe. Having a case on hand he tried the operation. Although he removed in the syringe a considerable quantity of the sub-retinal effusion or fluid, there was not much improvement except temporarily; the suggestion appeared to him to be desirable, because it seemed very natural that the effusion could be most surely removed by some such method as suction. The only difficulty with the hypodermic syringe is that it is too stiff, and he would suggest that this method might be cultivated by inserting a rubber tube between the end of the needle and the nozzle of the syringe, and in that way making an instrument somewhat similar to that which is used for the removal of soft cataract. He should think that the best manner for applying this prin-

ciple would be by means of some form of aspirator so as to draw the fluid from between the retina and the choroid.

DR. WEBSTER had had experience in one case of the use of hypodermic injection of pilocarpin in the Manhattan Eye and Ear Hospital. Some fifteen or twenty injections were given without any benefit. The case occurred in an out-patient. About the time the injections were ceased abscesses began to develop, and at every point where a puncture had been made an abscess formed. Possibly if the patient had been kept in bed, the result would have been better. He had reported to the Society two cases in which the retina was re-attached by simply keeping the patient in bed two or three weeks. He also thought Dr. Prout had reported a case treated in the same way.

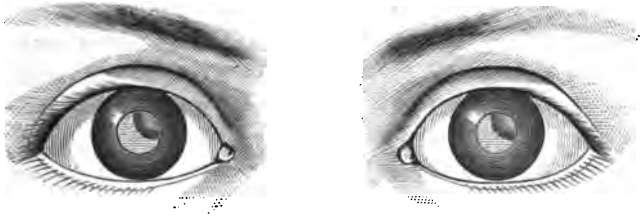
DR. THEOBALD asked Dr. Mittendorf if he believed any advantage accrued from giving pilocarpine hypodermically, He had employed it in some cases, but had not thought it necessary to give it hypodermically, as he obtained the full constitutional effects of the drug by administering it by the mouth.

TWO CASES OF ECTOPIA LENTIS, CONGENITAL DOUBLE; ONE CASE NON-SYMMETRICAL, THE OTHER SYMMETRICAL.

(*With woodcuts.*)

BY W. S. LITTLE, M.D.,
PHILADELPHIA, PA.

MR. ——, aged twenty-three, was seen January 2, 1880. Is very tall and spare; has a malformed chest-wall and nœvus



Non-Symmetrical.

on right hand. Right eye divergent strabismus. Tremulous iris in each eye; states a cousin is similarly affected; father is color-blind. Has experienced no trouble with his eyes, be-

yond the discomfort of restricted vision and annoyance of holding objects very close and uses only the left eye. Has been living in the country but desires to gain a position in the city.

R. E., V. = $\frac{2}{C}$.

L. E., V. = $\frac{6}{LXX}$.

R. E. (mydriatic): Pupil dilated very slightly. Crystalline lens is displaced upward and inward at about 45°; the lower margin of lens appears about the lower third of pupil; some vitreous opacities exist, but lens is clear as far as can be observed. Field of vision good. Tension of eyeball slightly reduced: + 8 ⌒ + 12 cyl .ax. 180°; V. = $\frac{16}{LXX}$; + 3 ⌒ + 12 cyl. ax. 180°; Snellen VI. at 12″.

L. E.: lens in same position as R. E. at the sclero-corneal margin up and out at 45°; there is a slight prominence, more so than in R. E., corresponding to the position of the lens. Lens clear, also vitreous. Tension — ½; + 8 ⌒ + 18 cyl. ax. 180° = $\frac{16}{LXX}$; + 3 ⌒ + 18 cyl. ax. 180°; Snellen I. at 12″.

Glasses were ordered as above.

November 2, 1880.—Had worn glasses with comfort and was in a position earning his living.

R. E., + 7 ⌒ + 12 cyl. ax. 180°; V. = $\frac{16}{LXX}$. L. E., + 7 ⌒ + 18 cyl. ax. 180°; V. = $\frac{16}{XXX}$; + 4 ⌒ with cylinders were given for writing.

Seen February 17, 1882.—R. E., V. = $\frac{16}{LXX}$. L. E., V. = $\frac{16}{XX}$ (with glasses). Has no trouble.

April 5, 1883.—Consulted me, stating that his vision in the L. E. was bad, and had become so suddenly. A few evenings before I saw him, as he was walking, he thought some one had struck at him and he dodged the blow, when on looking around he could observe no one near him to have done so; vision has been bad since.

Externally the L. E. on the outer scleral side shows rupture of an episcleral vessel. The tension of eye is reduced beyond the R. E. Objects the first few days appeared red; are now yellowish. Field is limited to objects on left side; central vision is lost. Ophthalmoscope shows a detachment of retina, slight in extent, up and out, dependent, and inter-

fering with central sight. He was leeched; given potassa iodid.

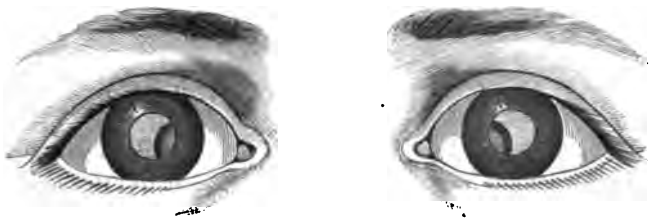
April 16th.—Vision had improved. I gave muriate ammonia internally.

June 22d.—Sees objects down and in and out sufficiently for protection; central vision defective; no total loss of field. V. = $\frac{5}{LXX}$; sees better in sunlight. If I am correct, observes the fluctuation of the slight detachment as it is reflected from his lens.

R. E., + 7, V. = $\frac{16}{XL}$; + 4, Jaeger No. 1 at 8″.

The left eye is now diverging, the right eye doing the work. Vision had improved a little in the L. E. when last heard from. The non-symmetrical position of the lenses in this case, is of interest; and the question arises, as to what influence the glasses may have had in producing the condition in the left eye.

The immunity for three years and freedom from trouble, favors strongly their not being a factor. He had become able to see so well and became so interested in his pursuits that he had come to accept responsibilities, sufficiently difficult for a well-formed eye. He bleeds very easily when scratched. Whether a nœvoid condition existed in the left eye, as elsewhere on his person, is, of course, impossible to consider. The sketch of the case by Dr. J. M. Taylor is accurate. (See woodcut on page 522.)



Symmetrical.

In addition to this case I desire to present another case, one of symmetrical ectopia lentis as occurring in the practice of C. S. Turnbull, M.D., of Philadelphia, and treated in the same way as my own. Dr. J. M. Taylor has sketched it very accurately. (See woodcut above.) The patient was a male,

aged sixteen, tall and spare. V. = $\frac{A}{CC}$ (binocular). Jaeger No. 4 at $\frac{1}{2}''$, R. E.; No. 4 at $2''$, L. E.

Seen October 3, 1880.—Pupils dilated about one-half, under atropia; lenses misplaced down and inward in each eye. Lenses slightly opaque.

R. E., + 4, V. = $\frac{16}{XL}$, + $2\frac{8}{4}$. Jaeger No. 1 at $8''$. L. E., + $3\frac{1}{2}$, V. = $\frac{16}{XL}$, + $2\frac{1}{4}$. Jaeger No. 1 at $8''$.

Patient had a contracted, highly vaulted roof of mouth; also mitral insufficiency. He wore his glasses with great comfort for over a year; was accidentally killed.

REMARKS.

DR. MITTENDORF referred to a case occurring in a girl, twenty-three years of age, otherwise perfectly healthy, who complained of her eyes, and on examination he found that the lenses were dislocated inward and upward. He gave the patient plus two and a half for near and four for distant vision, and she got on very well. He suspected that in this instance the difficulty was due to arrest of development in the suspensory ligament, and besides the lens was also smaller than normal and of different refractive power.

ON THE EMPLOYMENT OF NITROUS OXIDE AS AN ANÆSTHETIC IN OPHTHALMIC OPERATIONS.

BY GEO. T. STEVENS, M.D.,

NEW YORK.

WHILE the use of nitrous oxide gas as an anæsthetic is no novelty, its employment has been so largely confined to operations upon the teeth that its merits in other classes of surgical operations have been to some extent overlooked.

Its more general use in ophthalmic surgery would doubtless be greatly to the advantage of patients and surgeons.

Laughing-gas, in certain classes of operations, possesses several advantages over all other anæsthetics. It is the least dangerous, its use is not attended with nausea, headache, and other unpleasant symptoms characteristic of the use of ether or chloroform, and it demands for its administration

far less time and trouble than either of these. It is suited for short operations, and in such is quite as effective as either of the more commonly used anæsthetics.

Nitrous oxide may now be procured from any dental dépôt, condensed as a fluid in iron bottles. The bottles are made to fit in a neat case, which is by no means an unsightly object in the consulting-room, and the gas can be drawn by turning a screw. Neither patient nor apparatus require any preliminary preparation, and everything is ready as soon as the patient is seated in the operating chair.

My own experience in the employment of this anæsthetic has been very satisfactory. Operations in ophthalmic surgery are, for the most part, short, and they may be generally performed in the consulting-room of the surgeon. Hence the anæsthetic can always be at hand, and no time need be lost in preparing for its administration. Some of these short operations, such as upon the nasal duct and the eyelids, notwithstanding they are exceedingly painful, are usually, because of their brevity, performed without an anæsthetic, and delicate and highly sensitive patients are constantly required to submit to these unmitigated hurts and are charged not to complain of pain. All such short operations can be performed under the influence of gas, and in no case is there necessarily a loss of more than one minute of time in using the gas, and, as a rule, time will be actually saved. The patient, seated in the operating chair, takes a dozen or more inhalations of the gas,[1] the short operation is performed; the influence of the anæsthetic disappears, and the patient, who would otherwise have been a sufferer, arises from the chair unhurt, all perhaps in the space of less than two minutes.

But the gas is equally effective in nicer and more compli-

[1] Absolute insensibility is not essential, nor is it necessary that gas should be administered to the absolute exclusion of air, inducing deep lividity of the face. I have not observed the excessive hemorrhage, mentioned in the discussion, except where the face had assumed the deep black and blue color. A pale lividity of the upper lip and about the alæ of the nose, will generally indicate a sufficient degree of anæsthesia, and at this stage there is no excessive turgidity of the vessels of the face. G. T. S. January, 1884.

cated operations. Iridectomy, sclerotomy, tenotomy of the ocular muscles, and other operations, can be performed with infinitely less trouble than when ether or chloroform is used, and with as effective anæsthesia.

In tenotomy of muscles the gas has also the great advantage that the patient is able to use the eye at once, and the surgeon is in position to determine the result of his operation. I have on several occasions performed enucleation of the eyeball, using this anæsthetic, and have in only a single instance encountered any resistance on the part of the patient, and that of no serious character.

It may be doubted whether we can always be assured of the absolute passivity necessary in extraction of cataract from the use of laughing-gas, and it is probable that its employment is less desirable in this than in most other operations about the eye.

In brief, my experience has led me to the conviction that nitrous oxide may be employed with advantage in many operations about the eyes. Its use is attended with scarcely any of the inconveniences common to ether or chloroform, it is clean, it does not unfit the patient for immediate examination after operations, it is safe, and instead of requiring a large sacrifice of time on the part of the surgeon often saves time by enabling him to complete operations more rapidly.

REMARKS.

DR. STRAWBRIDGE asked if any mental hallucinations followed the administration of nitrous oxide.

DR. STEVENS replied that he has observed none.

DR. STRAWBRIDGE remarked that one of the prominent dentists in Philadelphia had been so impressed with the effects of the gas in this direction that he had absolutely refused to advise his patients to take it.

THE PRESIDENT used the gas many times during the past ten years and thought it had the advantages claimed for it to a certain extent. There were two features with reference to its administration, however, which had struck him as peculiar and worthy of notice: First, there is apt to be considerable rigidity on the part of the patient in some instances; second, it is apt to be attended with a great deal of venous conges-

tion, which gives rise to considerable hemorrhage in wounds about the eye.

DR. WEBSTER had seen one case in which the head moved almost constantly, and asked if this usually occurred after the use of nitrous oxide.

The PRESIDENT (in answer) said that it did not always occur.

DR. BULLER said the gas was given for some time at Moorfields, and it was thought strabismus and some other operations could be performed successfully, and several surgeons tried it, but it had been abandoned, and particularly because of the venous congestion produced, and besides that it was difficult to get the patient sufficiently quiet. He was certain that gas, given as it had been done in London, will not keep the patient sufficiently quiet to perform a cataract operation or an iridectomy. He had employed ether, allowing the patient to take it in quantities just sufficient to produce the first stage of anæsthesia, and for this purpose he had not found that over half an ounce was necessary to put them to sleep. With this primary anæsthesia he had been able to perform many little operations. The patient wakes up as soon as the operation is completed, and no inconvenience follows.

DR. R. H. DERBY referred to a case in which iridectomy was performed in a gouty subject suffering from extensive renal disease, in which a small quantity of nitrous oxide was first administered and the anæsthesia thus produced was prolonged by the use of ether, and it acted very favorably.

DR. STEVENS said that in the administration of gas much depends upon its purity, and it is possible that failures may have been due to impurities.

A CONTRIBUTION TO THE OPERATIVE TREATMENT OF GLAUCOMA.

BY ALBERT G. HEYL, M.D.,

PHILADELPHIA, PA.

NOT a more brilliant example of the value of the empirical treatment of disease is on record than the history of the application of the iridectomy to the treatment of glaucoma. Originating in what was doubtless the false interpretation of a keen clinical observation, applied to a disease which even to-day is an unsolved problem, acting in a way which Von Graefe himself could not explain, and which as yet lacks satisfactory explanation, it nevertheless, after twenty years of service, is the main resource in glaucoma. Of course, an operation with such a record must have substantial merit; by this, however, is not meant that the status of the glaucoma iridectomy as a remedial measure is fixed; this can never be until we understand the rationale of its action and the nature of the disease against which it is used. The practical consequence must be that cases present themselves for treatment where the iridectomy is performed, not because we are persuaded that it is the best *possible* procedure for the patient, but because we know of nothing better. It is a matter therefore of practical importance to enlarge our knowledge of the disease, and as a contribution I bring the record of an operative experience from my clinical work of the past year. About eleven months ago there came under my care at the Episcopal Hospital a man aged fifty-one, with the following history: Three and a quarter years ago he was seized during the night with pain in the right eye. Eyeball became red. Sight dimmed. The case drifted along for fifteen months without treatment, when he fell into the care of a specialist,

who recognized the case as one of chronic glaucoma, and for the relief of pain performed an iridectomy; the relief of pain was immediate, but two days after the operation hemorrhage occurred into the anterior chamber, violent pain developed, and under consultation with me, enucleation was proposed and performed.

Two years succeeding the enucleation he noticed a dimness coming over the left eye, without pain or redness in the eyeball; but two weeks after this was noticed violent pain set in; sight was reduced to seeing motion of hand, eyeball became red. He was treated for this apparently on an antiphlogistic plan, but obtained relief only when powders containing some hypnotic were given; then eserine was employed with the effect of bringing the vision to $\frac{18}{100}$. When he came under my care, about three months after the inception of the attack, the condition was as follows: Field very defective above and below, nasal half absent. V.$=\frac{18}{100}$, glaucomatous excavation of nerve, rigid pupil, turgid conjunctival veins; also a small turgid vein running parallel to the sclero-corneal junction, doubtless belonging to the ciliary system, was noted. Knowing the result of the operation on the other eye, which I attributed not to fault on the part of the operator, but to some peculiarity in the case which made the patient liable to intra-ocular hemorrhage; furthermore, making an observation in the fundus which I thought gave me a clue to the nature of the case, and my own views on the subject of glaucoma having been somewhat modified, I determined to make an effort to save the eye in some other way than by the iridectomy. Various internal remedies were first tried. No permanent result was accomplished in this way; the pathological change in the ocular circulation was obvious enough, but its explanation was not easily found. The selection of drugs to produce given effect was difficult, because of the obscurity which envelops their actual physiological action. The study of the physiology of the normal motor apparatus of the blood was further required, a very complex and difficult subject. So that in spite of all that done, the field of vision began to assume a slit-like form, central fixation to be impaired,

V.=$\frac{12}{200}$. It became evident something in the way of operative procedure must be done. I propose to precede the description of the operations performed in this case by a brief description of the vascular phenomena observed in the fundus, and by some formulated statements explanatory of them, in order that the idea of the operative procedure may be comprehended. The vascular phenomena observed in the fundus were these:

1. The narrow condition of the retinal arteries up to the sclerotic ring. This is a well recognized symptom in certain cases of glaucoma.

2. The relative large calibre of the trunk and two divisions of the arteria centralis retinæ lying in the excavation. This in my opinion was not an optical illusion, but due to actual dilatation or abnormal increase in calibre.

3. At the junction of the two radicles which formed the main upper vein there was an enlargement; instead of the two blood currents uniting with well defined angles, the points of junction were rounded, giving rise to a triangular accumulation of blood. The same cause which gave rise to the turgid retinal veins doubtless gave rise to this accumulation. There was then a vascular abnormality consisting of narrow retinal arteries except the disk portions, which were enlarged and pulsating, turgid retinal veins in which the current was extremely slow—so slow as to allow of its accumulation in a favorable locality. If now it can be shown that the same phenomena existed, at least in several other branches of the ophthalmic, and probably in all, we certainly have a very important clue to the nature of this case of glaucoma. This can, I think, be shown beyond reasonable doubt. The next thing is to find the explanation of these phenomena. To make my rationale plain it will be necessary to allude to some of the phenomena connected with the movement of the blood.

1. If we examine the flow of fluid through a rigid or elastic pipe, we may observe two things: (*a*) The fluid has tendency to escape from the orifice of the pipe with a given velocity. (*b*) It likewise has a tendency to burst through the walls of the pipe. The same things have been observed in the arte-

rial system, and hence we have the distinction between the velocity of the arterial current and its lateral pressure. The way in which these are regulated is very complex and obscure.

This much, however, is certain, that the muscular coat of the arterioles is a very prominent factor in the process. Precisely how this is accomplished is, I believe, unknown. My own theory is this. I believe that each tissue regulates its own supply of blood, and also so regulates the character of the capillary flow as the nutrition of the tissue-cell demands. Thus, in the retina, if the cells in a given spot demand that the capillary current which carries the nutriment be swifter or slower, they will make it so through the agency of the muscular coat of one or more arterioles. And so the whole of the branches of the central artery, with divisions and subdivisions lying in the retinal tissue, *i.e.*, from the sclerotic ring, is under the immediate control of the retinal cells. From the sclerotic ring toward the heart the remainder of the arteria centralis, composed of its trunk and divisions lying on the papilla, *i.e.*, as far as the sclerotic ring where the retinal tissue commences, is not immediately controlled by the processes of nutrition going on the retina. The result of such a distinction is this: the blood comes onward from the heart into the retinal arteries; the cells of the retina, through the vasa motor nerves of the part, send a command to the muscular coat of the arteries to contract; the arteries contract; the capillary current is slowed, and at the same time an accumulation of blood takes place in the remainder of the central artery, viz., in the trunk and in the portion of the branches lying on the papilla, accompanied by a dilatation or increase in calibre of this portion of the central artery. So that while the retinal arteries up to the sclerotic ring are in a state of systole, the remainder of the arteria centralis is in diastole. This, however, is scarcely momentary in duration when the condition is reversed; the retinal arteries go into diastole, the remainder of the arteria centralis into systole, and thus we have this to and fro movement in these two physiologically distinct sections of the arteria centralis retinae. The same phe-

nomena, I believe, exist in the other subdivisions of the ophthalmic, or of the intracranial carotid. Both the ophthalmic and internal carotid I include in the same physiological section as the portion of the arteria centralis retinæ from the sclerotic ring to the branch from which it springs. Now, such is the perfection of this mechanism that, under normal circumstances, the arterial current is forced through the retinal arteries in such a way that in ophthalmoscopic examination we notice no special distinction between the movement of the blood current in the disk arterial branches and the continuations in the retina.

Suppose, however, a pathological process impairing the contractility of the intra-cranial carotid, *e.g.*, sclerosis of its walls. Then the usual systole of the vessel, which should follow immediately the systole of the arterioles directly under the control of the tissue, is too slow in taking place; the rhythm is broken, the tissue arterioles remain in systole, the remaining segment of the arterial system in diastole pulsating with each cardiac impulse; engorgement of the eye takes place, and we have all the symptoms of acute inflammatory glaucoma. I think, therefore, that the peculiar vascular phenomena observed in the fundus of my case are simply indicative of a state which involves all the branches or subdivisions of the ophthalmic, and that the real source of the trouble was impairment of the contractile power of the intra-cranial carotid. There are a great many well established facts to substantiate the above theory, but I must reserve them for another occasion, as my object at present is simply to give reason for the operative procedure adopted in this case. As regards the operative treatment of a case of this kind two distinct methods are conceivable.

1. One which would so affect the ocular circulation as that, in spite of the defective contractile power of the intra-cranial carotid, the nutrition of the eyeball might be maintained sufficiently for the purpose of sight. I suppose that this is the way in which the iridectomy acts, although not after the explanation of Exner. Exner assumes that in glaucoma there is increased lateral arterial tension, and that lateral arterial

tension in general is dependent upon the resistance opposed to onward flow of the blood by the narrow calibre of the capillaries. That if we lessen the increased arterial tension by removal of a certain portion of iris capillaries, anastomosis will be set up between arteries which have been deprived of their capillaries and veins by means of vessels of larger calibre than capillaries; arterial tension will be lessened, the tension of the eyeball decreased, etc. It is impossible for me to do more than notice the two fundamental errors underlying this explanation. It is not true, as experiments show, that the lateral arterial tension is the result of the resistance of the capillaries, and further, so far from glaucomatous tension being indicative of increased arterial tension, there are facts which can hardly be controverted successfully, which go to show that decreased arterial tension is quite compatible with abnormal tension of the eyeball. Thus in my own case, when I opened the supra-orbital artery, as will directly be more fully described, the blood current scarcely flowed at all. From an enlarged conjunctival vein which was pricked on the one occasion scarcely a drop of blood flowed, showing that venous current was almost stagnant. The conclusion to be drawn from this is that increased intra-ocular tension does not always imply increased arterial tension. As I think that the iridectomy was inadmissible in my case so long as anything else offered a fair chance of success, I shall without further delay discuss,

2. A procedure which has for its object the reduction of the work required of the intra-cranial carotid. This is accomplished by isolating from this vessel a certain amount of tissue area which it supplies. This can be done without great difficulty by ligating the fronto-nasal and supra-orbital. Inasmuch as this procedure is novel, and the anatomical descriptions of the books are not sufficiently detailed to guide one in finding these vessels, a few notes bearing on the topography may be in order. The supra-orbital escapes through the supra-orbital foramen, and lies upon the periosteum of the frontal bone. The supra-orbital foramen, therefore, is the point of reference, and all the tissues down to the periosteum

must be divided in order to reach the vessel. The fronto-nasal artery escapes through the superior palpebral ligament and divides immediately into the frontal, which passes into the tissues of the brow, anastomosing with its fellow of the opposite side and also with the supra-orbital, and the nasal branch which passes down the side of the nose. We cannot locate so well the point of emergence through the palpebral ligament as in the case of the supra-orbital. Still, for practical purposes I think the following plan will answer: Find the fronto-nasal suture (the position of which can be readily estimated); conceive of a horizontal line passing through it; take a point midway between the supra-orbital foramen and the frontal suture, *i.e.*, the line of union of the two lateral halves of the frontal bone; let fall a vertical line through this point, and the point of intersection of this vertical line with the horizontal line passing through the fronto-nasal suture, will give about the point of emergence of the fronto-nasal artery. To ligate the vessel the skin and orbicularis must be divided. If the frontal branch alone is to be ligated above the brow, it should be remembered that it does not lie so deep as the supra-orbital, but after dividing the skin and peripheral portion of the orbicularis we are in the layer in which the vessel lies. Were the supra-orbital alone ligated, collateral circulation would be established through the frontal. If the frontal is also ligated, the intra-cranial carotid is cut off from its frontal area and collateral circulation will be established through a subdivision of the external carotid. If the fronto-nasal be ligated, there is also the same side of the nose cut off from the intra-cranial carotid, and a subdivision of the external carotid acts as collateral. Now, suppose the intra-cranial carotid and its subdivisions to possess normal contractility. The stasis induced by these procedures would doubtless be very transient, as the normal circulating apparatus possesses great compensating power.

From the well-known effect of the ligation of arteries there can be no reasonable doubt that the intra-cranial carotid would lessen its calibre, while that of the external carotid would be increased; and, further, if my rationale of action

of intra-cranial carotid in the propulsion of the blood be correct, the amount of work required of it would be lessened. In this case of glaucoma we have to do not only with defective contractility of the intra-cranial carotid, but with a carotid which has been in a dilated abnormal state for months. Doubtless, in a case like this, changes in calibre and progress toward normal propulsion of blood would occur with great slowness. The stasis consequent upon the operation would disappear very slowly also. Hence I believe it would be a good plan first to ligate the fronto-nasal, then to take up the supra-orbital, but before tightening the ligature, to open the vessel and allow an ounce or two of blood to escape to relieve or combat the tendency to stasis.

The operation, as conducted in my case, was an imperfect illustration of the one just described, because the rationale of the case was not at the time so clearly wrought out, and as the urgency of the case did not admit of delay, I was obliged to go somewhat on general principles. I first attempted to ligate the nasal branch of the ophthalmic. I failed because of incorrect ideas of the location of the vessel. I then successfully ligated the supra-orbital. As this procedure was a new one to me, I watched the result before attempting anything further. The primary effect was encouraging, but it did not last; collateral circulation was set up through the frontal, and the condition was really worse than before; there was the same tissue area, but fewer divisions of the ophthalmic to supply it. The condition began to grow rapidly worse. The frontal was then ligated, and thus the tissue area was effectually cut off from the intra-cranial carotid. It is too soon to judge of the ultimate effect of this, although two months have passed since the last operation. It must be remembered that the eye at the time of operation did not give prospect, even had an iridectomy been successfully accomplished, for a brilliant result. There had been for a month a good-sized hole in the iris from disintegration of tissue. The field was contracting to a slit-like form; central fixation impaired. Although vision was apparently $\frac{12}{200}$, yet it was so imperfect that I could not with the blackboard

take a satisfactory field. In other words, I had to do with a partially decayed and rotting eyeball, and to expect the immediate return of good sight under such condition after any procedure was clearly unreasonable.

I shall now record the most important notes made after the operation, and close this paper with a few brief comments.

March 21, 1883.—V. = $\frac{12}{200}$. Motion of hand at thirty feet. The following week the condition varied: sometimes better, sometimes worse.

March 29, 1883.—I attempted to ligate the nasal branch of the fronto-nasal artery. It was unsuccessful owing to my being misled by the position of the point of escape of the frontal artery from the orbit, as represented in Graefe and Saemisch. The incision was made too low, *i.e.*, too near the internal lateral ligament. It should have been made higher—about on a level with a horizontal line passing through the fronto-nasal suture. As it was, although the incision was prolonged along the nose, the artery was not found, and the wound was closed. No ether was given. Eighteen hours after the operation, wound united; stitches removed; slight chemosis in inner half of upper lid; no redness of the ball. If any change in the enlarged conjunctival veins, they are reduced in calibre. Cornea looks hazy; anterior chamber deep, and the pupil, which was wide in the light, readily contracted, in a dark room, one or two millimeters when light from the day by means of the ophthalmoscope thrown on it; details of the fundus scarcely discernible. A mist seemed to exist over the whole fundus; vision, if any change, worse. Sixty hours after the operation, chemosis of the upper lid had extended from the inner half over the whole extent of the lid; lower lid not involved; vision slightly improved; details of fundus clearer.

April 7, 1883.—Condition of the eye about the same as before the attempted ligation of the nasal artery. A hypodermic injection of one-sixth grain of morphia was given, and, with the assistance of Dr. J. Carpenter, resident, I ligated the supra-orbital artery. The incision was made below the brow, and the tissues divided on a grooved direction

until the supra-orbital notch was reached. The vessel was found by passing a strabismus hook under the tissues to the inner side and hooking it up. It was considerably larger in calibre than I expected, being, I estimate, 1.25 to 1.5 mm. in diameter. Possibly the vessel was dilated. A ligature was passed around it and tightened, not sufficiently to occlude the vessel, but enough to enable me to control the hemorrhage when I cut the vessel, should it be excessive. An opening was then made in the vessel between the ligature and the capillary part of the vessel. Some blood flowed, but then ceased. I loosened the ligature, and blood welled out of the artery slowly. In a few moments a distinct pulsation in the fluid filling the wound cavity could be detected. There was no arterial jet. The ligature was tightened, and the flow ceased. I closed the wound. Immediately after the operation the eye was examined. Details of the fundus were dim, but a very violent pulsation of the disk arteries could be seen. Before the operation the media were quite clear, and if there were arterial pulsation on the disk, it did not begin to be as violent as after the operation. Radial pulse was 84.

April 8th.—Upper lid œdematous over the whole surface, and purple in color; no increased congestion of the conjunctiva; can with difficulty open the lid. Pupil of medium size; could not examine fundus. Has had no pain in the eyeball. Patient speaks of prickly sensations over the left side of the head.

April 9th.—Swelling increased in the upper lid and extended to the lower; no chemosis of conjunctiva. Eyeball seems practically unchanged so far as external appearances go.

April 10th.—Swelling of lids diminishing; the enlarged conjunctival veins look very much injected, more so than before the operation. No diffuse injection of the conjunctiva. No pain in the ball, but patient speaks of some pain in the socket back of the ball.

April 11th.—Was able to get an imperfect view of the fundus; details dim; main upper vein seems small; the venous enlargement at the junction of the two veins looks as if it had disappeared.

April 12th.—Ligature loose in the wound; pupil is dilated; details of fundus dim. The venous enlargement has certainly disappeared and the main upper vein is of normal size. A decided arterial pulsation could be seen in the disk. Sight about what it was before the operation.

April 14th.—Vision increased to seeing motion of hand to about five feet; pupil is slightly more contracted than at last note; enlarged conjunctival veins small in calibre but after the ophthalmoscopic examination larger. Media quite clear; slight arterial pulse in the excavation. Main upper artery quite traceable from disk toward the equator except for a space of two or three disk diameters from the sclerotic ring; lower main artery traceable to equator; venous enlargement in main upper vein still absent. Light perception slightly improved over that before the operation. No pain in the ball.

April 16th.—Has had some pain starting from the left inner canthus and radiating over the left side of the head, accompanied by a sensation of heat. Sight has varied to-day; sometimes it appears clear, then cloudy, then clear; interior of the same as the last note; a branch of the main upper artery traceable into temporal half of retina.

April 19th.—Vision has increased to detecting motion of hand at thirty feet. Slight tendency to recurrence of venous enlargement in main upper vein; yesterday all day had pain in the eye similar to that he had experienced after abstraction of blood with the Heurteloup leech from left temple.

April 23d.—The enlarged conjunctival veins seem larger than ever. After rather prolonged examination there were blotches of injected venules which emptied into the large veins; in the fundus retinal main upper and lower arteries are increasing in size; enlargement on the main upper vein absent.

April 26th.—Field and vision about same; fundus somewhat hazy. The projection of fundus seems to have changed so that details of fundus seem nearer; the first impression made by the excavation was that it had become shallower. The refraction of the bottom of excavation was about con-

cave, $\frac{1}{4}$ of the edge of the excavation emmetropic. The bends in the vessels as they pass into the excavation seem as pronounced as before. The arterial vessels seem to be developing, *i.e.*, vessels not before visible are traceable. No pain in the eye, but some over the left brow.

April 30th.—Exterior of the eye about the same. Interior not so satisfactory; arteries have become small, almost imperceptible. There is a tendency for the enlargement again to form on the main upper vein; arterial pulsation in excavation. I tested the tension for the first time since the operation; ball hard. Following the testing of the tension details of fundus became dim; arterial pulsation, also marked venous pulsation in the excavation.

May 2d.—Condition of fundus somewhat improved; the enlargement of the main upper vein has disappeared; arteries are still very difficult to follow; an improvement noted in the field, in that he can now project light correctly from the lower half of the retina far toward the equator. He was given internally gtt. iij. of Fowler's solution ter die, but the following day sight having become dimmer it was stopped, and ordered eserine locally. Eserine continued for a week.

May 10th.—Vision not as good. Light perception seriously worse. I stopped the eserine.

May 12th.—Can hardly detect the motion of hand at fourteen feet; ball is hard. Slight indications of enlargement of main upper retinal vein; the arteries slightly more visible.

May 14th.—Vision is worse and about equal to what it was before the ligation of the supra-orbital. Pulsation in the frontal artery can be easily felt.

May 15th.—Enlargement of main upper retinal vein more visible. Met Dr. G. Peirsol in consultation, and after some hesitation it was agreed that the frontal artery should be ligated. My view was that collateral circulation had set up through the frontal artery, and that what good had been accomplished through the ligating of supra-orbital had been neutralized. Patient was not feeling very well; he was somewhat pale and haggard, but there was no time to be lost. I accordingly made the incision over the brow. The vessel

does not lie so deep as the supra-orbital, and it was cut in searching for it. It bled freely, much more so than the supra-orbital. There was no arterial spurt, only pulsating flow of blood. I caught the end with the artery forceps and ligated it. The immediate effect, if any, upon the enlarged conjunctival veins, was that they became smaller. The most marked change was observed with ophthalmoscope. The details of the fundus were so dim that they could not be recognized, except the pulsation of the arteries in the disk, which, perhaps, was more violent than before the operation.

May 16th.—Twenty-three hours after the operation. Patient has been in bed since the operation; passed a restless night. Slight œdema of upper lid near the inner canthus; under stimulus of ophthalmoscopic examination, pupil contracted to about 3 mm. diameter. Interior of eye very hazy. Can detect no details at first, but after looking a while it cleared up, and I could detect the outline of the nerve and the main upper vein, but no more. Pulse normal; has not been feeling well for a day or two, owing to diarrhœa; says there has been a great deal of "working" over the left side of the head, doubtless from the disturbance in the circulation.

May 17th.—Œdema has involved the whole upper lid; felt sick and giddy this morning; was obliged to go to bed. Lips are blue; pulse, 84.

May 18th.—Is better. Has had a good deal of pain over the brow and left side of the head. Has a sensation of something running down over the forehead. The œdema of upper lid is subsiding, but has extended to the lower; and inasmuch as it has a reddish tinge, and there is erysipelas in the ward, it is possible that the patient has had a slight touch of it.

May 23d.—Ligature came away; swelling out of the lids; fundus not yet visible. Tension over the sclera seems about normal.

May 24th.—Details of fundus becoming visible. The main upper vein seen with tolerable distinctness. A violent arterial pulsation seen on the disk, about equal in degree to that seen immediately after ligation of the supra-orbital, and al-

together unusual in this case. It seemed to me, also, that the vein in excavation pulsated; whether it really did so, or was simply moved by the beating artery, I could not tell.

May 26th.—Iris perhaps slightly more contracted; anterior chamber deep; conjunctival veins unchanged; media slightly clearer; arterial pulsation in the disk slight. Main upper and lower arteries traceable from the disk to near the equator bulbi, and seem to be approaching normal size; they are probably larger than I have seen them during my eleven months' observation of the case. The main upper vein probably stands in normal relation, as regards size, to the main upper artery. This morning, at 4 A.M., felt sharp pain in the eyeball, which lasted half an hour. At 8 A.M. there was considerable bleeding from the right nostril. The tinnitus in the right ear unaffected; during the day a great deal of "working" through the head.

May 28th.—Fundus perhaps more clearly seen; arterial pulsation in the excavation very violent. In the main upper vein a movement recognized, probably pulsatile, existing through the whole extent of the vessel, and probably also existing in other retinal veins. Tension is increased; ball feels quite hard; very little pain in it; no epistaxis. A great deal of "working" and prickling sensation over the left frontal region and side of the head; also some giddiness.

May 31st.—Ball softer; tension normal. Fundus much more clearly seen. Pulsation of the disk arteries feeble and irregular. Retinal arteries traceable; the retinal veins have increased in size. The sight, however, did not seem so good. Patient could not detect the motion of the hand so well, and the light perception and projection worse. No epistaxis; no sharp pain; very little sensation of "working."

June 2d.—Is uncertain whether he can detect the motion of the hand beyond five feet. Light perception and projection slightly improved over the last examination. General appearance of the eye is encouraging; anterior chamber deep. Iris not any more dilated; under light stimulus it contracts, I think, with perceptible motion. Media quite clear. Retinal arteries thin, but traceable from sclerotic ring

to periphery; lower main retinal artery pulsates in the retina. Slight pulsation of the disk arteries. Tension, on slight touch, feels normal; on stronger pressure there is an abnormal sensation of hardness.

June 6th.—Condition unchanged.

June 7th.—Anterior chamber rather shallower; media not quite so clear. Arterial pulse in excavation slightly more pronounced. Tension has again increased. Light perception has improved; he thinks he sees better. Since last note there has been considerable working all around the head; last evening slight epistaxis from right nostril; for the last week the tinnitus in right ear has diminished perceptibly.

June 11th.—Media clearer than I have noted since the operation. Pulsation in one of the radicles of the main upper vein. Tension of ball normal. After I left him on the 7th inst. slight bleeding from the right nostril. On the morning of the 8th inst. slight bleeding from the left nostril, and in the afternoon profuse bleeding from the same. Previous to at least one of these hemorrhages a great deal of "working," he thinks, inside of the head; has also been some giddiness. If any change in the vision it is not so good. The arterial pulsation in the excavation varies; at times very feeble, even perhaps quiescent, then it becomes momentarily quite active. He has been taking tincture of iron for some time, and to eliminate this as a cause of the epistaxis, it was stopped.

June 14th.—Some improvement in the light perception in the upper half of the field. Motion of hand at two feet. Slight mistiness of the fundus; the details of fundus seem more as if some change had occurred difficult to define; perhaps the projection of the fundus has changed. A very feeble disk arterial pulsation. Upper main artery apparently double the calibre that it heretofore has exhibited. The venous enlargement at the junction of the two radicles of the main upper vein has nearly disappeared. Tension slightly above normal. To-day and yesterday a sensation of warmth noticed over the left brow.

June 18th.—A few drops of blood from the right nostril since last observation; anterior chamber of normal depth.

A tendency to staphylomatous protrusion of upper portion of anterior external quadrant of the sclera. Interior of the eye so cloudy that I can barely see the course of the main upper vein. No pain in the eyeball, and has had none.

June 21st.—Fundus more easily seen. Detected floating opacities in the vitreous, a thing not before observed in this case; opacities were apparently black. Disk arteries, slight pulsation. Main upper retinal artery very distinct and about the same calibre as the disk continuation. Vision has increased to detecting motion of hand at six feet. No pain, no epistaxis; slight working over the brow. Tension, if changed, slightly increased over last observation.

June 25th.—External appearances about the same except that one of the branches of an enlarged conjunctival vein has nearly disappeared. Detail of fundus clearly seen. Arterial disk pulsation very feeble. Tension has still further increased; ball is hard. Vision, if altered, slightly better. Pulsation in the branches of temporal artery going toward the brow easily felt.

June 28th.—Arterial branches in the retina, which previously were invisible, are coming into view. Scleral tension is still increased, refraction of the fine vessels crossing the temporal half of the glaucoma halo, = H. $\frac{1}{20}$ to $\frac{1}{24}$.

July 2d.—Ball still as hard as at last observation; no epistaxis; no pain, but a kind of headache accompanied for two or three nights by a blowing sound in the ear.

July 5th.—Head symptoms subsided. A feeling of soreness over the whole frontal region. Has been slight pain in the eyeball. Media clearer than at last examination. Slight disk arterial pulsation, at times difficult to see, and apparently irregular, sometimes giving a pronounced pulsation and then subsiding. Tension has lessened. Vision does not seem so good. Anterior chamber shallower.

July 7th.—No material change, unless that the refraction of fundus seems more myopic; seems to require $-\frac{1}{8}$ to give the details definition.

July 9th.—The branch of the enlarged conjunctival vein, which had become small in calibre, has enlarged again;

light perception a trifle better. Tension is normal. Counts fingers at six feet.

July 11th.—Counts fingers at eight feet. Tension perhaps slightly increased. The enlarged conjunctival veins of small calibre.

July 12th.—Vision not so good; can barely detect motion of hand at six feet. Media clear. Projection of fundus nearer. Refraction of fine vessels on external half of glaucoma halo H. $\frac{1}{48}$. Very slight pulsation of disk arteries. Venous accumulation on the upper retinal vein absent. Pupil more contracted. Conjunctival veins smaller, as if diminishing in calibre. Scleral tension harder, if changed at all.

July 16th.—Has had an attack of cholera morbus. Has been obliged to go to bed. Tenesmus, nausea, anorexia, headache, and some working over the left temple. No pain in the eye. Vision slightly better; also light perception. Media clear. Arterial disk pulsation could not be detected even with the finger on the radial. Tension normal.

This note is the last made previous to my leaving home to attend the meeting of the Society. The case is still under observation, and doubtless will be some time before the definite result can be known. I may recall the fact that we have to do in this case with an eyeball diseased for a full year; it is in a state of partial decay analogous to the condition known as senile gangrene, but presenting peculiarities of its own by reason of the characteristics of the organ assailed. Granted that we obviate the original cause of the trouble, it is evident that something more is necessary to restore the normal condition of the eyeball. The structural elements must first take on normal activity, and this, if it occur, must require time, and perhaps the discovery of some method of stimulating the cells. I bring this contribution, therefore, not as an account of a successful operative procedure, but rather as a clinical contribution bearing on the etiology and therapeutics of glaucoma. I will close by a brief allusion to some of the many points in the clinical record already given.

1. I shall notice some peculiarities connected with the circulatory apparatus of this eye: (*a*) The trunk of the supra-

orbital was doubtless of abnormal calibre; the pulse-beat of it scarcely perceptible; the flow of blood from the opened vessel extremely feeble. These conditions, it seems probable to me, existed likewise in the disk portions of the arteria centralis retinæ, likewise in the trunks of the other divisions and subdivisions of the ophthalmic. (*b*) The flow of blood from the frontal was more free, probably, because it had already acted as the collateral supply to the frontal region. (*c*) The effect of the ligation of both vessels may be divided into that which was produced upon the ocular and orbital circulation and that produced upon the intracranial circulation. The effect upon the ocular and orbital circulation manifested itself immediately after the operation. The enlarged conjunctival veins were not noticeably affected, the main vascular change observable being the very pronounced character of the disk arterial pulsation; this at least after ligation of supraorbital; in the case of the frontal the obscuration of the fundus being so great that I could not speak positively about it; later, when the fundus could be more clearly seen, it was just as pronounced as in the case of the supraorbital. This pronounced pulsation I suppose was due to the local stasis following the ligation, in consequence of which the blood was driven with greater force into the arteria centralis retinæ. The venous enlargement on the main upper vein disappeared after ligation of supraorbital, but recurred again and with its recurrence vision sank rapidly. This was perhaps about the time that the collateral circulation was being established. After ligation of the frontal it again disappeared, but very much more slowly. The effect on the intracranial circulation was as follows: After ligation of supraorbital scarcely any effect was noticed except, about five weeks after the operation, a blowing sound in the right ear. After ligation of the frontal a much more pronounced effect took place and evidently not confined to left side—epistaxis largely from the right nostril, giddiness, cessation of the blowing noise in the right ear.

The occurrence of temporary vitreous clouds was doubtless caused by some change in the intracranial circulatory apparatus. Probably these changes will still occur, as it is evident

the collateral circulation is very slow in being established, and these effects of changes in intracranial circulation showed themselves during a period of some weeks after the operation. This all points to some abnormalities in the intracranial circulation.

All of these observations have an important bearing upon the etiology of glaucoma, as it must be accepted as beyond dispute that in acute inflammatory glaucoma not only does a disturbance of the physiological blood-supply of the eye exist, but also one that is altogether peculiar. To trace the connection at present would take me far beyond the limits of this paper.

2. Let us refer to the cloudings which obscured the details of the fundus. At least two varieties were noticed: (*a*) Those which recurred immediately after the ligations of the arteries. This variety was evidently dependent upon the vascular disturbance set up by the operation. So far as the eye was concerned this would seem to be the result of the more rapid propulsion of blood into a vascular apparatus acting in abnormal manner, and in which the venous stream is very nearly at a standstill. Not only so, but I was able to demonstrate in my case that the propulsion of the blood through certain conjunctival venules was more rapid than through the venous trunk which they formed; the blood in the venules would accumulate and be discharged with considerable rapidity, while in the main trunk very little change would be observed. No doubt the same condition existed in other ocular venules. The effect of a sudden increase in the velocity of the arterial current would be simply to increase the venous stasis. How is such a condition related to the steamy condition of the cornea? I think a well-established fact throws light upon this question. I quote it from Cohnheim:[1] "The lymph-flow from any part of the body is noticeably increased so soon as the escape of venous blood from the same is obstructed. Place a canula in one of the lymph-vessels on the external side of the leg of a dog, and there will flow very little lymph from it, in the

[1] Cohnheim: Allgemeine Pathologie, s. 119.

course of several minutes scarcely a drop. Ligate now the principal veins of the leg, and immediately the lymph begins to drop from the canula with greater rapidity, so that as many cubic centimetres may be collected as drops before the ligature was applied." From all this it seems probable to me that the steamy condition of the cornea is simply caused by an abnormal escape of lymph into the corneal tissue; with the decrease in the venous stasis the corneal clouding would disappear. It is possible that the lens likewise was involved in a similar manner. (*b*) The details of the fundus were likewise obscured by vitreous clouds. This occurred, so far as I am aware, but once. It was of short duration, occurred seven weeks after ligation of the frontal, and at a time when other symptoms showed that intracranial circulatory changes were taking place. These vitreous clouds, as far as could be known from ophthalmoscopic examination, belonged to the same class as those clouds which are not uncommon in myopic eyes of high grade; sudden in inception, unaccompanied by any symptom indicative of an active inflammatory process. I suppose these clouds may be supposed to be the result of stasis in some of the ocular vessels. The coincidence in time of the cerebral vascular disturbance and these vitreous clouds is worthy of note.

3. The effect on the tension. After the immediate effect of the ligation of the supraorbital had passed away and favorable symptoms were developed, a change for the worse occurred, perhaps connected with the establishment of the collateral circulation through the frontal. The ball became very hard at this time. Just before the ligation of the frontal there was a tendency to softening; after this various changes were observed, tension even becoming normal.

If, as I believe, the tension of the eye is intimately connected with the state of the circulation, these various changes are explained.

4. I notice finally the change in the projection of the fundus which occurred. There were times when the fundus of the eye would appear nearer the eye than at others. Every one who is accustomed to observe the distances at which

the fundus details in normal eyes are projected know very well that there is considerable variation even in the eyes of the same refraction. Now in this glaucomatous eye variations of this kind occurred. This must have been due, I think, to some alteration in the position or shape of the crystalline lens. An interesting point in connection with these variations was an apparent change in the depth of the excavation. It would appear shallower, perhaps, were the vessels at the margin of the excavation not so abruptly ended, but more easily followed into the excavation. This was doubtless an illusion depending upon alteration in the projection. Graefe[1] placed on record an observation of this kind, illustrating it with drawings of the disk both before and after the iridectomy. He would draw from them a proof of the dependence of the excavation upon the increased pressure. It does not appear from the record that this matter of change in projection from alteration in position or shape of lens was taken into account, and it seems, therefore, to me that, so far from this correct clinical observation being explained by an actual shallowing of the excavation, it was simply an optical illusion.

REMARKS.

DR. WEBSTER said that while the doctor was relating his case it occurred to him that some years ago, he read an article in some California medical journal, in which the writer advocated ligature of the carotid artery for glaucoma, and that some specialist had performed the operation once and cured his patient.

DR. HEYL said that the application of a ligature to the carotid artery would have an entirely different effect from the operation referred to in his paper. Ligation of the carotid of one side would be followed by dilatation of that on the other, also the vertebral; and when once the collateral circulation is established the ocular blood would go on as before. Were sclerosis of the intracranial vessels present there doubtless would be more or less difficulty in those vessels accommodating themselves to the changed conditions. The operation described in the paper was based on the assumption that the intracranial carotid performed an important function in the

[1] Archiv für Ophthalmologie, iv., 2, 127.

propulsion of the blood to the tissue which it supplied, that the greater the tissue area the greater the power which the carotid must furnish. Cut off a given area of tissue from it and the less work it will have to perform.

THE PRESIDENT said that the natural history of cases of acute glaucoma must be considered before deciding the influence of such effects upon the circulation as would be produced by the operation suggested by Dr. Heyl.

DR. SEELY said that the California operation and the operation suggested by Dr. Heyl were exactly the reverse.

SOME ADDITIONAL REMARKS ON THE THEORY OF THE ASTIGMATIC PENCIL.

(With Woodcut.)

BY G. HAY, M.D.,
BOSTON, MASS.

IN the "Transactions of the American Ophthalmological Society" for 1871, after showing that small astigmatic pencils of straight lines may be conceived in which the focal lines are oblique to the axis of the pencil, I remarked that "the conclusions arrived at by means of the formulæ given by Knapp, that there may be two focal lines each perpendicular to the axis, are subject to certain conditions: First, the algebraic expressions for the distances of the focal lines from the origin must have *real* values, and not be imaginary" (that they might be imaginary was stated in Knapp's article, *A. f. O.*, 1862). "Second, the equations [1] must exactly represent the pencil."

Before considering these two conditions, it may be well to discuss somewhat equations [1] namely:

$$x_1 = Ax_0 + By_0$$
$$y_1 = Cx_0 + Dy_0$$

It has been shown (see *Archives of Ophth. and Otol.*, vol. ii., p. 79) that if

$$B = O$$

and

$$C = O$$

the focal lines will be rectangular, each to the axis of the pencil, and to each other.

If

$$B = C$$

we can reduce the case to the preceding by changing the coordinate axes.

If

$$B = O$$

and C is not zero,

we shall have a pencil in which the two focal lines are perpendicular, each to the axis, but not to each other.

To show this: Let the notation be as in the *Archives of Ophth. and Otol.*, vol. v., p. 497. Then for any ray of a pencil we have the equations

$$x = x_o + z(x_1 - x_o)$$
$$y = y_o + z(y_1 - y_o)$$

If now, making B equal to zero, we put in these equations

$$x_1 = Ax_o$$
$$y_1 = Cx_o + Dy_o$$

we have

$$x = [z(A - 1) + 1]\, x_o \qquad [2]$$
$$y = [z(D - 1) + 1]\, y_o + zCx_o \qquad [3]$$

If we put

$$z = -\frac{1}{A - 1}$$

then by [2] and [3]

$$x = o$$
$$y = -\frac{C}{A - 1}x_o + \left[1 - \frac{D - 1}{A - 1}\right]y_o$$

that is, for every ray of the pencil there is a point, whose coordinates are

$$z = \frac{1}{A - 1}$$
$$x = o$$

and the corresponding value of y. The locus of these points is a focal line in the co-ordinate plane Y Z, and perpendicular to the co-ordinate axis Z, at the distance $-\frac{1}{A-1}$ from the origin.

Again, if

$$z = -\frac{1}{D-1}$$

then by [2] and [3]

$$y = -\frac{Cx_o}{D-1}$$

$$x = x_o \frac{D-A}{D-1}$$

$$\frac{y}{x} = -\frac{C}{D-A}$$

That is, for the point in each ray, whose co-ordinate z is $-\frac{1}{D-1}$, the corresponding x and y have a constant ratio to each other; the locus of such points is a straight line in a plane perpendicular to the co-ordinate axis Z at distance $-\frac{1}{D-1}$ and intersecting this axis.

Such locus is a focal line in a plane perpendicular to the axis of the pencil and not at right angles to the other focal line, as C is not zero.

If B and C are unequal and neither is zero, and if

$$-4BC < (A-D)^2$$

or if

$$-4BC = (A-D)^2$$

it may be shown by changing the co-ordinate axes that the two focal lines will be as in the case just considered.

To come back to the principal object of this communication, let us consider the first of the two conditions mentioned above, namely: that the distances of the focal lines from the origin must have real values. We find that these distances will be imaginary if we have

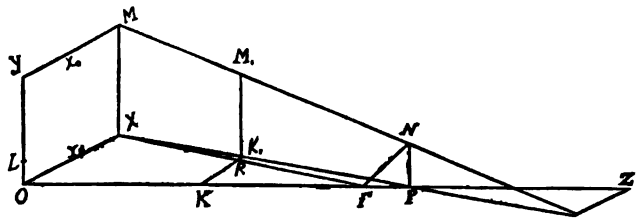
$$-4BC > (A-D)^2 \qquad [4]$$

that is, if B is not zero, and if C is not zero; and if B and C are of contrary signs and of such values that the inequality [4] holds. In this case equations [1] do not, by Kirchoff's method, as given by Knapp (*A. f. O.*, 1862), show any focal line at right angles to the axis.

The inequality [4] will be satisfied by the values,

$$A = 1$$
$$D = 1$$
$$C = 1$$
$$B = -1$$

If with these values we consider the annular pencil consisting of the rays intersecting the plane $X_o Y_o$, each at the distance r from the origin, the section of this pencil perpendicu-



lar to the axis will be everywhere a circumference of a circle which becomes larger as it is more distant from the origin, and in which there can be no focal line, oblique or perpendicular, to the axis.

In fact, this annular pencil will be a hyperboloid of revolution generated by the rotation of the hyperbola, with semi-conjugate axis unity and semi-transverse axis r around its conjugate axis; this latter may be considered the axis of the pencil.

As to the condition that the equations [1] should exactly represent the pencil, this is not always the case.

If we take rectangular axes and the focal lines as shown in the figure, in which F N represents an oblique focal line in plane Y Z, we shall find that the pencil which passes from the neighborhood of O toward Z, and each ray of which intersects the focal line F N, and another focal line parallel to

O X, and intersecting O Z (O Z being the axis of the pencil), is not subject to equations [1].

For, in the first place in this case, as all the rays of the pencil which intersect O Y remain in the plane Y Z, we shall have for any ray intersecting the axis O Y at a short distance above the origin, say at L,

$$x_0 = 0$$
$$x_1 = 0,$$

then for this ray by the first of equations [1],

$$x_1 = 0 = By_0,$$

and as y_0 is not zero,

$$B = 0,$$

and as B is a constant, the first of equations [1] becomes for this pencil

$$x_1 = A\, x_0 \qquad [5]$$

This last equation, however, is not true for this pencil, as we see by the figure, in which

O X, O Y, O Z are three rectangular co-ordinate axes.
O Z is also the axis of the pencil.
M is in plane Y X.
M X and M_1 K_1 are each perpendicular to plane X Z.
K_1 K is in plane X Z, and perpendicular to O Z.
O K is unity.
M Y = O X, that is, x_0 for the ray M M_1 is equal to x_0 for the ray X F, but
K K_1 = x_1 for the ray M M_1
R K = x_1 for the ray X F.

Then $\frac{x_1}{x_0}$ is not constant for this particular pencil. Consequently, equation [5] does not hold for this pencil; that is, equations [1] do not both hold for this pencil.

REMARKS.

DR. KNAPP, of New York, said that Dr. Hay had ascribed the development of this general formula to him, which was not the case. In the paper to which Dr. Hay had referred he distinctly stated that the development of the general formula was by Professor G. Kirschoff, who had had the kindness to give it him in manuscript. Dr. Knapp had applied it to the human eye according to his own measurements. Dr. Knapp said Dr. Hay made the statement that it can be imagined that the focal lines may at times not be at right angles with each other, but only at right angles with the visual line. This statement is against all our practical data. He only remembered, when studying the subject, that it was stated in all the books to which he had access that the focal lines in any symmetrical surface must be at right angles with each other. He thought there were only one or two books where it was stated that they may not be at right angles, but that these were not the best authorities. He asked Dr. Hay if he could demonstrate that they cannot be otherwise.

DR. HAY said his paper referred to pencils of straight lines, and that, as he understood it from the analysis of pencils of straight lines which Dr. Knapp gave in 1862, it was possible that the focal lines might be at right angles with the axis of the pencil, and not at right angles with each other. (See *Archiv. Ophth. et Otol.*, ii., 1, 80.)

Dr. Hay distinguished between a physical pencil of light and a geometrical pencil of straight lines. But as a physical pencil of light he thought the case does occur where one of the focal lines is oblique to the axis. If you take a bi-convex lens and suppose a peripheric small pencil coming along parallel to the axis of the lens, and striking the lens toward its periphery, we know that its rays will come down and meet the axis of the lens, and the more peripheric rays will meet the axis nearer to the lens, and so a small portion of the axis of the lens will be a focal line of the refracted pencil, and oblique to the axis of this refracted pencil.

DR. KNAPP said that we sometimes get better results in mixed astigmatism by using a convex and a concave cylinder, thereby making one meridian emmetropic and correcting the astigmatism for the other. The reason for that may be that the mathematical formula strictly applies only to a pencil of rays of an infinitesimally small aperture, whereas the pupil

formed a diaphragm of from two to four millimetres in diameter.

THE PRESIDENT said he had noticed that fact and he was also acquainted with the use of two cylinders at right angles; another fact that the field is flatter in mixed astigmatism, with considerable astigmatic error, there is better correction for the peripheral part by employing a bi-cylindric glass than there is when spherico-cylindrical glasses are used in the usual manner.

DR. KNAPP said there was another point which had puzzled him, he had sometimes found that when he had corrected myopic astigmatism with cylindrical and spherical glasses as well as possible, the glasses held vertically before the eyes, the patients obtained a greater acuteness of vision by looking obliquely through a concave spherical glass. Mostly it was the upper outer edge of the spherical they were looking through, and obtained thus a sharpness of sight greater than he had been able to give them by any combinations of spherocylindricals.

DR. HAY thought that as both meridians became stronger (though in different degrees) that the result is equivalent to a stronger spherical glass + a cylindrical glass. Possibly the improvement in vision may be due in part to the stronger glass.

DR. KNAPP said that increase of the strength of the glasses had not improved vision to the degree the patient acquired by looking through the edge.

DR. HAY continued: Usually the formulæ refer to small pencils, which are easier to study; but the consideration of larger pencils is more difficult.

DR. MCKAY said, concerning looking above or below the centre of the lens giving better vision, that he had met with quite a number of those cases, in which he continued to persevere with trial glasses until he obtained correction by which that effort was overcome entirely and the patients would see best through the centre of the glass. He thought one of the cases was seen by Dr. Thomson; at all events he derived great benefit from reading what Dr. Thomson had written on the subject, and thought the Society would be interested could he be induced to speak.

THE PRESIDENT called upon Dr. Thomson, of Philadelphia, who said that the case alluded to by Dr. McKay was one of conical cornea. He thought that the difficulty in many of the cases we meet with arises from the fact that in some cases of astigmatism there is an amount of divergence at the apex of

the cornea, which cannot (?) be corrected. He was inclined to think so because in that case and in others, by producing slight displacement of the head, the patients find a place where they see best. He had found cases in which he had been obliged to correct for the periphery, and leave the centre uncorrected.

DR. MITTENDORF, of New York, said that, for the same reason mentioned, he thought any mechanical arrangement for determining the nature of astigmatism, such as the astigmometer or the eye meter, for holding the glasses in front of the eye, did not prove so satisfactory as holding the glasses with the fingers.

THE PRESIDENT asked a question in connection with cases of conical cornea, and it was whether any of the members had had experience in the use of hyperboloid lenses. He had tried them in several instances and had not found them of value.

DR. KNAPP said he had not used them.

DR. HAY thought he obtained with the best hyperboloid lenses about the same vision which in the case of one eye had been obtained with spherico-cylinders, and it was much easier to make the correction. He referred to a case seen by Dr. Noyes and himself.

THE PRESIDENT said that the patient subsequently regarded the hyperboloid lenses as of no particular value to him.

FOUR CASES OF SARCOMA OF THE UVEAL TRACT.

(*With Woodcut.*)

BY CHARLES J. KIPP, M.D.,

NEWARK, N. J.

CASE I. *Melano-Sarcoma of Ciliary Body and Adjacent Choroid and Iris.*—Mrs. H. H., of American birth, seventy years of age, was first seen July 3, 1882. Is in pretty good health. Is not aware that the eye about which she wishes advice has ever been injured. The right eye is apparently normal in every respect; the left eye has been blind for six months. There is not now, and there never has been, any pain in the eye itself. Occasionally she has had a "drawing" pain about the eye. On examination of the left (blind) eye, the anterior parts were found to be healthy; there were no signs of irritation; pupil was of medium size; the lens was not very clear. After dilating the pupil with atropine, examination with oblique illumination showed, not far behind lens, in temporal half of vitreous chamber, a large *yellowish-white mass* of nearly round form, on the anterior surface of which were a number of small red patches (hemorrhages). On nasal side the retina seemed detached and floating about. The eye could not be illuminated with ophthalmoscope; the eye was totally blind. Tn. The mobility of the eye was unimpaired in every direction. Enucleation of globe was advised but not accepted.

Six weeks later the patient returned with the statement that she had suffered very great pain ever since her visit to me. There was now great chemosis and injection of the whole ocular conjunctiva. The swelling around the cornea was so great that the cornea was almost hidden by it; the

cornea was steamy. The anterior chamber was very shallow and the pupil very widely dilated. T. +2.

The eye was enucleated on following day and the wound healed kindly and rapidly. Six weeks later there was no relapse.

On opening the eye two-thirds of the vitreous chamber was found to be occupied by a round tumor, of a dark color, which sprang from the ciliary body and the anterior part of the choroid. The anterior surface of the tumor was loosely covered by the thickened and opaque retina. After the tumor had been hardened it was examined microscopically and was found to be made up of large spindle-shaped cells, many of which contained pigment. There was scarcely any intercellular substance. Numerous blood-vessels and many free masses of pigment were found all through the tumor. The retina had undergone connective-tissue degeneration. The base of the tumor was in close contact with the sclerotic throughout, and in several places the inner layer of the sclerotic only was invaded by round and oval cells. The iris adjoining the tumor was much thickened by the infiltration of round and oval cells.

CASE II. *Melano-Sarcoma of Choroid in an Eye which Twenty Years before had Suffered from Chorio-Retinitis.*— W. P. R., American, thirty-four years of age, was first seen at Newark Charitable Eye and Ear Infirmary, August 21, 1882. With the exception of an ozæna was in good health. States that twenty years ago he had a severe eye trouble, since which time his vision has been somewhat impaired in both, but more especially in the left eye. Since two months he has noticed gradual failure of sight in the right, which formerly was his best eye. The eye has not been injured. It is emmetropic, S. $\frac{5}{36}$. The visual field was defective in outer half and much contracted in all other directions. Tn. On examination nothing abnormal was detected in anterior half of eye; the media were perfectly clear. On looking into the vitreous chamber after the pupil was dilated the attention was at once arrested by a semi-globular tumor which nearly filled the nasal half of the chamber. The most projecting part of

the tumor reached nearly the visual axis of the eye. The surface of the tumor was perfectly smooth and of a yellowish-red, mottled appearance; it was covered by the transparent retina, the vessels of which could be readily distinguished from those of the tumor. With the exception of a slight detachment at the base of the tumor, the retina was in its place. The optic disk was white and opaque and its margin was slightly blurred; the vessels were very thin. A little below the disk there was an atropic patch in the choroid.

The left eye showed a white opaque disk, small retinal vessels, numerous small atrophic spots in choroid, especially at periphery, and numerous pigment deposits of irregular form in different parts of the retina, S. $\frac{5}{18}$. Field concentrically contracted. Hemeralopia.

Although the sight of the right eye was still tolerably good, I advised immediate enucleation of this eye, which advice the patient declined to follow.

On May 12, 1883, I saw the patient again. He was now nearly frantic with pain in the right eye and the whole head. His eye presented the appearance of an acute inflammatory glaucoma. The media were so turbid that the interior of the eye could not be illuminated. T.+2.

I enucleated the eye on the same day; the wound healed rapidly. Up to date there are no signs of a relapse.

The eye was opened immediately after enucleation, and presented the following appearance: Retina detached in the form of a funnel. On nasal side a large dark tumor of irregular form, which was attached to choroid by a moderately broad base. In the choroid, especially at periphery, were many spots of much lighter color than the rest of this membrane. The microscopical examination of the tumor showed it to be made up of small spindle-shaped cells, very few of which contained pigment. The tumor was very vascular and contained many free masses of pigment. The tumor probably originated in the outer layer of the choroid, as the chorio capillaris could be more or less distinctly made out in different parts of the tumor. The base of the tumor was in close con-

tact with the sclerotic, which was, however, free from sarcomatous elements.

CASE III. *Sarcoma of Choroid, originating in the Region of the Macula.*—Mrs. I., American, forty-one years of age, a large, healthy-looking woman, consulted me for the first time February 12, 1882. Loss of sight of right eye was her only complaint. Impairment of vision was first noticed a year ago, but located in right eye by accidental closing of the left only three months ago. There was no pain; the eye had not been injured.

The anterior half of eye presented nothing abnormal. Refractive media were perfectly clear. The only abnormity visible was an opacity and a projection of the retina in the region of the macula. The retina was of a grayish hue over a round space equal to perhaps three diameters of the disk. At the periphery of this space the grayish tint gradually faded. Running horizontally across this space were several lines of somewhat lighter color, which did not, however, change their places with movements of the eye. The retinal vessels were of normal number and regularly distributed. They were uncommonly distinct in the opaque retina. The summit of the protuberance was best seen with a + 4 dioptrics glass, while the rest of the fundus was best seen without a convex glass by the emmetropic eye. The sides of the elevation sloped gradually to the normal level. No fluid could be discovered behind the opaque retina, and there were no signs of a cysticercus. The remainder of the retina was entirely normal, and the choroid was apparently healthy. The disk was normal. There was a large central scotoma corresponding to the opaque area in the retina. Peripheral vision was about the same as in the other (good) eye. Tn.

I suspected a choroidal tumor, and so informed my associates at the Infirmary, but did not inform the patient of my suspicions. She was kept under observation for several months, during which time she took considerable quantities of the iodide of potassium, which greatly relieved her headaches but had no appreciable effect on the eye. As she did not improve under treatment, she discontinued her visits to me

in May of the same year. During the three months she was under observation I examined the eye carefully about once a week, but was not able to discover at any time a change in the eye.

About fifteen months after her last visit she called on me again. She had then been suffering great pain in eye and head for several weeks. The eye presented the ordinary symptoms of acute inflammatory glaucoma. T. + 2. I enucleated the eye July 8, 1883. The operation was performed in the usual way, and the wound healed in six days.

The eye was divided by a horizontal section. The retina was detached everywhere, except at the optic nerve entrance and at region of ora serrata. A large tumor, dark in color, and irregularly pyramidal in form, was connected with choroid from the optic nerve entrance to the equator. It consisted of spindle-shaped cells, and contained but little pigment. It probably started from the outer layer of the choroid, as the chorio capillaris was tolerably well preserved in many parts of the surface of the tumor. Although in contact with the sclerotic over a large space, no sarcomatous cells were found in this membrane.

In a paper on the "Diagnosis of Intra-ocular Sarcomata,"[1] Becker says: "Choroidal sarcomata originating in the region of the macula seem from the very beginning to have but little disposition to proliferate in the interior of the eye, but are prone to develop posteriorly in the orbit." That this does not always occur is proved by the above case.

CASE IV. *Melano-Sarcoma of Ciliary Body and Iris.*— Mrs. C. D., a healthy-looking woman, forty-two years of age, consulted me for the first time in August, 1875, for the purpose of obtaining relief from great pain in her left eye. According to her statement, this eye had never been injured and its sight was good till a few months ago, when she accidentally noticed that she was unable to recognize large objects with it. Up to a fortnight before she came to me the eye had never been uneasy, but since then she has suffered

[1] Archives of Ophthalmology and Otology, vol. i., page 694.

very much from pain in and about the eye. On examination it was found that she had only perception of light. The tension was markedly increased (T. + 2). The lids were healthy. The eye was of normal size and form, and its mobility was unimpaired. The conjunctiva was healthy. Around the cornea was a zone of enlarged subconjunctival veins, several of which pierced the sclerotic about 3 mm. from cornea. The cornea was normal, the anterior chamber of normal depth, and the aqueous quite clear. The pupil was widely dilated and almost immovable.

On looking at the iris, attention was at once attracted to the middle part of the temporal half, which was swollen and of a dark slate color. This swelling extended about two millimetres above and below the horizontal meridian, and from the periphery to within 1 mm. of the pupillary margin. The anterior surface of the swelling was in contact with Descemet's membrane. The remaining part of the iris was of same color as the other eye, and of normal texture. The lens was transparent, and apparently in its proper place. The vitreous body was somewhat hazy. The fundus oculi presented the usual appearances of chronic inflammatory glaucoma, viz., a kettle-form excavation reaching to the margin of the disk, distention and tortuosity of the retinal veins, and spontaneous pulsation of the arteries on the papilla. The choroid was normal. When the eye was abducted as far as possible, an indistinct, circumscribed, dark, reflex was obtained from the outer ciliary region, on a line with the swelling of the iris. With the oblique illumination a similar reflex was observed in the same position.

Believing the case to be one of sarcoma of the iris and ciliary body, with secondary glaucoma, I advised the enucleation of the eyeball, and performed the operation in the usual manner three days later. The wound healed by first intention, and four days after the operation the patient was discharged from the hospital. Nearly nine years have now passed since the eye was removed, and as yet there are no signs of a relapse. The patient is in good general health.

An examination of the eyeball by transmitted sunlight, im-

mediately after the operation, showed it to be perfectly transparent, except at the outer ciliary region, where a dark mass was seen to project toward the axis of the eye.

The eye was hardened in Müller's fluid, and opened by a section passing through the middle of the tumor. The cornea and sclera were apparently normal. In contact with the inner surface of the cornea and sclera, on the temporal side of the eye, was seen a growth of irregular form, occupying the place of the ciliary body and extending into the anterior chamber. This growth extended backward to the junction of the ciliary body and the choroid, and anteriorly about three millimetres into the anterior chamber; it occupies about eight millimetres of the circumference of the ciliary body, and measures at its most projecting point (immediately posterior to the equator of the lens) about four millimetres in thickness. Its posterior surface is convex, of a dark color, and closely covered by the membrana ciliaris retinæ. After the removal of the latter it is seen that whilst on the middle portion of the posterior surface the ciliary processes had entirely disappeared in the growth, they were preserved near the margins of the tumor. In its forward growth the tumor had detached the iris from its connection with the cornea for a space measuring about six millimetres in width, so that the iris appeared to grow out of the tumor. The iris itself was greatly swollen when it was in immediate connection with the tumor, but in every other part it appeared normal. Of the zonula zinnii, the part in contact with the tumor had almost entirely disappeared, probably by atrophy from pressure. The lens was perfectly transparent, and in its proper place, but its form has undergone a change in such a way that the antero-posterior diameter of the outer half was increased at the expense of its equatorial diameter. The nasal half of the lens was apparently of normal curvature. The vitreous body showed no abnormity. The ciliary body appeared healthy outside of the region occupied by the

tumor. The choroid and retina were in normal position, and showed no abnormity. The optic papilla was deeply excavated.

The microscopic examination showed the growth to be a very vascular melano-sarcoma, which had probably originated in the inter-muscular conjunctive tissue of the ciliary muscle, and subsequently invaded the iris.

REMARKS.

DR. MITTENDORF asked Dr. Kipp if he had seen metastatic sarcoma of the choroid?

DR. KIPP replied that he had not.

THE PRESIDENT remarked that in relation to these tumors of the choroid, there was a point which might deserve consideration, that is, under what circumstances the tension might be increased or diminished, or the eye remain normal. The clinical history in such cases in this particular is very vague, and we can scarcely predict when that condition may be expected to arise.

CASE OF OSSIFICATION OF THE CHOROID.

BY CHARLES J. KIPP, M.D.,
NEWARK, N. J.

THE eye was removed from a young man, twenty-two years of age, who was first seen ten years before the eye was enucleated. At that time the eye was free from all signs of irritation. There was an adherent chalky cataract, which, according to statements of the child's parents, was first noticed by them shortly after birth. The iris was atrophic. The eye diverged, and had but imperfect perception of light. As the case was hopeless so far as the restoration of sight was concerned no treatment was advised.

Ten years later the patient was seen again. He was now suffering great pain in the eye. There was much circumcorneal injection. The cornea was clear, the anterior chamber of normal dimensions, and the aqueous clear. The iris

was much bulged forward in its central portion, while the pupillary margin was completely fastened to the anterior capsule and the periphery of the iris was retracted. The pupil was very small, and of the form of a crater. The cataract was as before. The anterior upper ciliary region felt soft to the touch, while at every other part the sclerotic was very hard. The eye was enucleated in the usual way, and the wound healed kindly and quickly.

Examination of the eye showed a very thick deposit of a hard substance (bone) over the whole inner surface of the choroid, reaching to the ciliary body. The bony capsule was perforated at the optic nerve entrance. The retina was detached in the form of a cord. The choroid was thickened. A thick diaphragm extended across the eye, and was adherent to the ciliary body. The lens was in front of and closely connected with this diaphragm. The lens was of bony hardness in parts, but no bony structure could be discovered here. The bony capsule showed the ordinary characteristics of bone.

The specimen was presented on account of the very extensive formation of bone, which is certainly not very common; and also because of the youth of the patient from whom the eye was taken. It is doubtful whether there is another case on record in which the formation of bone in the eye occurred so early in life.

TWO CASES IN WHICH "TRITURATION OF THE CORTEX" WAS PRACTISED IN CONNECTION WITH PRELIMINARY IRIDECTOMY, TO HASTEN THE DEVELOPMENT OF SLOWLY RIPENING CATARACTS.

BY SAMUEL THEOBALD, M.D.,
BALTIMORE, MD.

ACTING upon the suggestion put forth by Professor Förster, of Breslau, in a paper which appeared in a late number of the *Archives of Ophthalmology*,[1] I have attempted recently in two cases to hasten the development of cataracts, which were very slowly maturing, by having recourse to the procedure which he has called *trituration of the cortex*—a kneading or bruising of the anterior cortical layers of the lens by pressure upon the cornea, after iridectomy, and while the anterior chamber is still empty. In the first case the excision of the iris was followed by hemorrhage into the anterior chamber, and this obscured the pupil to such a degree that the trituration, which was done with the angle of a strabismus hook as recommended by Professor Förster, was very imperfectly performed. In the second, in which the kneading was done with the smooth end of a Bowman's tortoise-shell cataract spoon, that seemed better adapted to the purpose, there was no hemorrhage, and the operation was satisfactorily completed. In the first, the operation was followed by but slight change in the condition of the lens; in the second, however, a very rapid development of the cataract ensued.

In each there occurred a sufficient amount of iritis to cause slight but persistent adhesions to form between the iris and

[1] On the Maturity of Cataract; its Artificial Ripening, Corelyses, and Extraction of the Anterior Capsule. Vol. X., No. 3, September, 1882.

lens at the pupillary angles of the coloboma ; and in the second case it was found, upon examination by oblique illumination a day or two after the operation, that near the cut edges of the iris the pigment layer had become detached from the muscular coat in a manner which was quite peculiar. That the iris should be more or less bruised, as well as the lens, however carefully the trituration be performed, appears inevitable, and the risk of exciting inflammation in this way seems the chief objection to the procedure. It would appear, however, that Professor Förster has not had serious trouble from this source, as he makes no reference to it in his paper.

CASE I.—Mrs. E. M. C., American, aged seventy-two, had been under observation since January, 1881, with immature cataracts. In March last, when the operation was decided upon, she could still count fingers by reflected light at 15″, and make out letters of J. No. 24 with the left eye, in which the cataract was most advanced, although she could not see well enough with both eyes to get about by herself, nor had she been able to do so for some months previously.

The operation was performed, under chloroform, March 20th, an upward iridectomy of medium size being made upon the left eye, and the anterior surface of the lens triturated with the angle of a strabismus hook as previously described. Two months afterward the lens was perceptibly more opaque, and fingers were counted with difficulty at any distance. May 19th, no further decline in vision having taken place, the cataract was extracted without accident, chloroform, preceded by a hypodermic of morphia and atropia, being administered. Recovery was uninterrupted, and on June 22d, when glasses were prescribed, she was able with the left eye to make out words of J. No. 1, to read No. 2 quite well, and had V. $= \frac{20}{xxx}$.

CASE II.—Mrs. E. H., German, aged fifty-four, had been under observation since January, 1881 ; cataracts, which were then incipient, the opacity in each eye being confined chiefly to the peripheral portion of the posterior cortex, having developed very slowly during this time. Just previous to the operation, which was performed upon the left eye on May 26th, the condition of the lens was carefully examined with

dilated pupil. Much clear lens matter was still present, the opacity being confined chiefly to the nucleus and peripheral cortex, and with the ophthalmoscopic mirror a decided red reflex was obtained through the enlarged pupil. Within ten days after the trituration the lens was decidedly more opaque, and by June 14th the red reflex had entirely disappeared. When last examined (July 14th) the entire lens was opaque, the opacity extending quite to the capsule; mother-of-pearl sectors, however, were still present, and for this reason, and because of the very hot weather, it was thought best to postpone for a few weeks the extraction operation.

REMARKS.

DR. GRUENING had performed Förster's operation twice during the last year, and had already given the result of the operation at the April meeting of the New York Ophthalmological Society. The first case was that of a lady, upon whom he had operated for cataract in one eye; she had an immature cataract in the other eye, and inquired whether or not something might be done to hasten the ripening of the cataract. Dr. Gruening performed a large iridectomy upward, and with the angle of the strabismus hook also triturated the lens, but only in the area of the pupil. The result was that no iritis occurred, and the lens became completely opaque within one week. He extracted the lens three weeks subsequently with a very good result.

The second case was that of an old gentleman highly myopic in both eyes with double cataract. The condition of the gentleman for four or five years was very sad; he was gradually losing the power of reading, and he was anxious to retain his position which entirely depended upon his vision. Dr. Gruening proposed this operation to him, and in March of this year he came to New York, where he performed iridectomy upward, and again triturated the lens, as in the former case, only in the area of the pupil, and in four days the lens was completely opaque. He has not yet performed cataract operation. But if the patient continued to do well, he should in September remove the cataract. There are certainly cases in which the operation is indicated and is attended with great gain.

DR. KIPP performed the operation some time ago, and the

lens became opaque, but within four or five days it cleared up again.

DR. MITTENDORF said his experience had been equally favorable with that related by Dr. Gruening. In a second case, however, iridocyclitis followed, which destroyed the eye. Ever since Dr. Gruening had suggested to confine the triturating process to the pupillary space, he had been pleased with it, and had not had iritis or any other unpleasant symptoms develop. He thought the operation was especially indicated, under certain circumstances, when two cataracts are forming at the same time, or when the patient has only one useful eye.

DR. KNAPP said he had performed the operation once, and it had not seemed to hasten the ripening of the cataract very much.

DR. WADSWORTH had performed the operation but once, on a lady eighty years of age, in whom the cataract was very slow in maturing. Although he had endeavored to confine the pressure as much as possible to the area of the pupil and coloboma, there resulted some slight adhesions of the pupillary edge, and there seemed to be no effect at all so far as increasing the opacity of the lens was concerned. He thought the effect would be probably quite different in different cases. To illustrate the resistance a lens sometimes offers, he mentioned a case of partial diabetic cataract, stationary for a long period, in which he had three times, at intervals of a week or ten days, thrust a cataract needle into the lens, but at the end of six months, aside from the visible scars in the capsule, there was no increase in the opacity of the lens.

DR. WEBSTER said that when in London in 1881, Mr. Cooper was trying a series of operations upon immature cataracts, and up to that time he said he had been successful in his operations. Dr. Buller, if he recollected aright, was house surgeon at that time, and he wished he would tell the Society whether or not Mr. Cooper continued his experiments.

DR. BULLER said he was not prepared to speak positively on this subject with regard to trituration of the surface of the cataract after preliminary iridectomy, but ten years ago it was regarded as no new operation as he recollected; he could not make any statement as to the results owing to the difficulty of following up such cases in hospital practice.

DR. L. WEBSTER FOX said he was house surgeon at the time at Moorfields when Mr. Cooper was operating in this way, and that he made a series of cases in which he resorted to different operations for ripening the cataract, but he was

unable to give any definite statistics with regard to the results.

THE PRESIDENT said he had performed the operation eight times, and in seven cases had performed extraction subsequently. The only cases in which anything serious complicated the operation was that of a patient who developed marked iritis, and on extracting the cataract, it became necessary to perform iridotomy in order to get a clear pupil. In operating upon the second eye in the same patient a slight iritis followed, but not nearly so severe as after the operation upon the first eye, and it did not interfere with the subsequent extraction, which was entirely satisfactory.

In one other patient adhesion of the iris took place with the lens in consequence of the preliminary operation, but it was not disadvantageous to the subsequent extraction. In all of the cases subsequently submitted to extraction this operation has been accomplished without detrimental influence, and all the cases had turned out successfully. The duration of time after the operation for bringing the lens into suitable condition for extraction had varied considerably, that is, from three weeks to two months. He did not know whether any one could anticipate in any particular case that the process of maturing would be more or less rapid. It is interesting to watch the development of opacity, and to notice that it does not make its appearance upon the surface which has been directly the subject of friction; in other words, upon the anterior surface of the lens; it may make its appearance upon the posterior surface of the lens in some cases, and in other cases it may be general.

Again, he had not noticed any swelling of the lens, such as takes place in traumatic cataract. In his own mind he had not felt sure whether an increase of opacity in lens has been due directly to the friction of the anterior surface, or whether it might not be ascribed to tension placed upon the suspensory ligament and interference with its nutrition about its periphery. His experience was such that it enabled him to say that the operation was a valuable addition in a particular class of cataract cases, and that it is free from danger to any important extent when it is carefully managed.

DR. GRUENING remarked that by the area of the pupil he meant the pupil, including the coloboma. He would also ask Dr. Noyes whether he observed iritis in those cases which were treated in this manner, that is, trituration made in the area of the pupil.

THE PRESIDENT said that iritis did not occur to any extent

except in three cases. In all of his cases he confined the operation as nearly as possible to the centre of the cornea.

DR. WEBSTER asked if, when the cataract was extracted, the lens came out entire.

THE PRESIDENT replied that there was apt to be a good deal of cortex at the extraction.

DR. WEBSTER replied that in looking over Dr. Agnew's cases he found two in which vision was sufficient to count fingers, and the lens came out entire and the result was as good as the average, that is, one vision $\frac{20}{30}$, and the other $\frac{20}{60}$, without inflammation during recovery. Whether he would have gained anything by the preliminary iridectomy and trituration of the lens he was unable to say.

DR. THEOBALD said he took it for granted that no one would think of attempting to triturate the lens through the iris. In his cases the trituration was confined to the pupillary area. Even under such circumstances, however, he believed the iris tissue was more or less bruised, because it was impossible to press the cornea against the exposed surface of the lens with sufficient force to comminute the cortical substance without pinching the pupillary edge of the iris between the lens and the cornea.

DR. DYER asked as to about how long the rubbing process was continued by Dr. Noyes?

THE PRESIDENT replied that it was difficult to state how long the trituration should be continued. In his cases the performance of friction was continued probably for a longer time than ordinarily is necessary from the fact that the anterior chamber was full of fluid, and with sufficient force to depress the cornea decidedly, but not sufficient to give rise to loss of vitreous or rupture of the ligament.

VASELINE CERATE—A CONVENIENT BASIS FOR OINTMENTS INTENDED FOR APPLICATION TO THE EYELIDS.

By SAMUEL THEOBALD, M.D.,

BALTIMORE, MD.

FOR several months I have been using with much satisfaction, both in private and hospital practice, as a basis for ointments intended for application to the eyelids a cerate made of yellow wax and vaseline. Previously I had employed either simple ointment or cold cream; but as both of these have a decided affinity for oxygen they soon become rancid, and the substances incorporated with them—especially the frequently prescribed yellow oxide of mercury—undergo chemical changes which render them unfit for use. Plain vaseline, which many make use of for this purpose, is not open to this objection; but as it melts at the temperature of the body it is not well adapted for external application. Several years since, by melting paraffine and vaseline together in proper proportions, I obtained an ointment of sufficient firmness, but its consistence was such, lacking the stickiness, that it was not well suited to smearing upon the lids. More recently, by substituting yellow wax for the paraffine—this being found to give an ointment of better consistence than white wax—I have obtained an article which has proved in every way satisfactory. The cerate is prepared without difficulty, by melting the wax and vaseline together with a gentle heat, and stirring the mixture until it hardens. The specimen exhibited was prepared in this way, it contains one part of yellow wax to four parts of vaseline, which proportion gives an ointment of sufficient firmness, except perhaps in very hot weather, when the proportion of wax may be in-

creased to one part to three. The other specimen shown, an ointment of the yellow oxide of mercury, containing two grains of the mercury salt to one drachm of vaseline cerate, though prepared nearly four months since, and kept with no special care, still retains, as will be seen, its bright yellow color, and has undergone no appreciable change.

Cerates prepared with vaseline, I am told, are in use; but I am not aware that attention has been called to the convenience of employing in the manner here suggested.

A CASE OF BLINDNESS FROM RETINAL THROMBOSIS IN CONSEQUENCE OF FACIAL ERYSIPELAS.

BY H. KNAPP, M.D.,
NEW YORK.

ONLY a limited number of cases of blindness in consequence of facial erysipelas is on record. Their symptoms vary considerably. There is a lack of ophthalmoscopic examinations during the first stage of the affection. Not long ago I had the rare opportunity of observing such a case almost from the beginning to the end. The results appearing very remarkable in many respects, I feel justified in bringing them to the notice of the society, so much the more so as I can lay before you a number of ophthalmoscopic drawings representing the different stages of the disease. The case is as follows:

Mr. E. F., a gentleman aged forty years, had lived long in the tropics. He contracted syphilis, and showed in the course of years secondary and tertiary symptoms, which commonly were aggravated when his business called him north. On March 20, 1883, while in New York, he was affected with erysipelas, which began in the nose, proceeded to the pharynx, cheeks, and orbits. Temperature, 104°; pulse, 120–130. On March 22d the swelling had reached the forehead, both ears, and both sides of the neck. On the 25th the general symp-

toms abated, pulse and temperature were normal, but the eyelids were more swollen, and chemosis and exophthalmus made their appearance. March 27th the sight of the right, and March 28th that of the left, eye was impaired. March 29th he was totally blind. Drs. Gulecke and Schottke, under whose care the patient was, and who kindly allowed me to publish the case, had made deep incisions into the upper and lower parts of each orbit, without liberating pus. On March 29th they called me in consultation. I found both lids of each eye swollen, dark red, hard, shining; conjunctivæ chemotic; both eyeballs moderately protruded, completely immovable, the pupils wide and immovable; no perception of light. Carbolized drainage-tubes were in the incisions. The right cornea had a superficial ulcer, somewhat obscuring the fundus. Apart from this ulcer the media of both eyes were clear, and a distinct view of the fundus could be had. The appearance of the left fundus (represented in Fig. 1)[1] showed a milky retina, pervaded by numerous dark, almost black, tortuous, overfilled blood-vessels, which, tapering, converged to a common centre, and had upon and between them many irregular dark hemorrhages. The character of all the vessels was the same, they appeared as enlarged veins. The picture resembled that which I have seen in some cases during the first days after resection of the optic nerve in removal of orbital growths and after optico-ciliary neurotomy. My opinion was that the ocular affection was thrombosis of the retinal veins, and complete obstruction of the central retinal artery by compression from the swollen and hardened cellular tissue of the orbit. Prognosis quoad visum pessima, quoad vitam dubia, ad bonam vergens. Treatment derivative, especially diaphoretic.

Two days later, March 31st, I found the swelling of lids and conjunctivæ less, the right cornea hazy, details of right background not discernible. The left cornea and media were clear, the fundus less white (Fig. 2). The dark and tortuous

[1] The drawings, executed in chromo-lithography, will appear in the first number of the thirteenth volume of the Archives of Ophthalmology.

veins appeared the same as two days previously ; some, however, were thicker and had elliptical intumescences. Between and crossing them were seen thin, straighter, and red vessels (arteries) with punctate, striated, and irregular bright red (fresh) hemorrhages, whereas the older ones were dark brown. A trace of the optic disk was visible, but the yellow spot could not be made out. In its vicinity there were many old hemorrhages. The periphery of the fundus was whitish red, pervaded by dark blood-vessels, among which the arteries were not distinguishable. The hemorrhages at the equator were small and round; beyond the equator there were none. Eyes moved again, though little. V. = 0.

April 2d.—Right eye still greatly swollen and protruded ; mobility very limited ; cornea clears up ; fundus visible, the same picture as in the left. Left eye less swollen ; mobility increased ; the whole disk now recognizable ; milky appearance diminishing. Vessels and hemorrhages the same.

April 4th.—L. disk well defined, homogeneous, pervaded by two tortuous thin vessels, the up and down branches of the central artery. R. disk visible, veins go to its centre, background clearing, but still full of old and new hemorrhages. No perception of light.

April 6th.—T. ? Retinæ clearer. Veins less black, being now brown. Arteries distinguishable, reaching, in left eye, to centre of disk, in right the veins reaching likewise to centre of disk ; the arteries not so far. V. = 0, each eye.

April 9th.—Vessels thin on and near disk, with white seams lining a thin red thread in the centre. The vessels are thicker at the periphery. Disks and retinæ clearing. Hemorrhages the same.

April 18th.—Some portions of veins appear as white lines, the rest are filled with blood. Disks quite white. Arteries likewise partially interrupted by white lines.

April 22d.—Condition of left eye presented in Fig. 3. Disk white. Arteries and veins clearly distinguishable. Arteries in some places bordered with white seams (opacity of the vascular walls by defective nutrition), and like the veins in some places interrupted by snowy-white lines (white thrombi).

The veins in some places appear nodular, like a rosary, but there is no movement of the contents of the vessels, either spontaneously or on pressure upon the globe. Hemorrhages still numerous.

May 1st.—More portions of blood-vessels are converted into white streaks. Left od white as paper.

May 25th.—Feels well. Both eyeballs move somewhat to the right and to the left, but not in any other direction. Pupils large, immovable. V. = 0. Odd white; all the upper and most of the lateral blood-vessels converted into white streaks varying in thickness along their course; in lower part some perfectly pervious, others interrupted by white segments. The branches in region of yellow spot numerous and all white.

June 28th.—Almost all arteries white, irregular, some breaking off suddenly (Fig. 4). In region of yellow spot, a beautiful network of anastomosing white lines. Retinal tissue semi-transparent, with white patches, especially in region of yellow spot. The two lower vessels (inv. image), one artery, one vein, red. In the right eye only a few white vessels and one or two red ones visible, disappearing from view not far from the disk. V. = 0 in each eye. The movements of both eyes are restored, the exophthalmus has disappeared, the tension and external appearance of the eyes are normal, except a corneal opacity in the right, and a wide, immovable pupil in both.

Reserving a detailed discussion of this case for a publication in the *Archives of Ophthalmology*, I restrict myself here to the following remarks:

1. The blindness was produced by compression of the central retinal arteries and subsequent thrombosis of the retinal veins, both having been directly observed with the ophthalmoscope one day after the occurrence of the rapid, almost sudden loss of sight.

2. The ophthalmoscopic appearances, observed from beginning to the end, showed no neuro-retinitis, but the successive stages of thrombosis.

3. The decrease of the swelling of the orbital tissue, or

the establishment of collateral circulation from the choroid, permitted the return of a limited flow of blood into the retinal arteries, which, however, being impeded by the blocked veins, led to renewed extravasations, to thrombosis and shrinkage of the arteries, and finally to atrophy of the optic nerve.

4. Perivasculitis played no, or only an unimportant, part in the pathology of this case.

5. The white segments in the veins and arteries were white thrombi, not hypertrophy of the walls of the blood-vessels.

6. The thrombosis was present, in all probability, also in the orbital veins, but did not, as in other cases, extend to the cerebral sinuses.

Of the recent literature on the subject I confine myself to mention here:

1. A paper by Leber, *Graefe's Arch.*, Vol. XXVI., Part III., p. 224.

2. The inaugural dissertation of Dr. J. Hoesch, containing a case, under the care of Dr. Baumeister, of Berlin, almost identical with the one here reported, only incompletely observed and differently explained. Berlin, 1881.

3. A paper on "Orbital Cellulitis as a Sequence of Facial Erysipelas," by Henry W. Williams, of Boston. *Boston Medical and Surgical Journal*, January 18, 1883.

4. A monograph of 270 pages on "Orbital Phlegmone, with Consecutive Blindness," by A. Schwendt, written under the auspices of Professor H. Schiess, of Basel. Basel, 1882.

REMARKS.

DR. KIPP asking whether there was any marked retinitis,

DR. KNAPP replied that there was a milky appearance of the retina, but it was limited to the central part, as it was in embolism; the periphery was normal. There was no neuro-retinitis. The nerve was never swollen at all.

DR. KIPP said that in all the cases which he had seen this condition which Dr. Knapp described was found at some portion of the fundus, and in these cases the retina, or its vicinity, was in a state of inflammation, at least opaque not between the veins, but in the surroundings of the veins.

DR. KNAPP remarked that what struck him most in this case was that after a certain time segments of the veins be-

came white and he thought that fact could be used as a diagnostic symptom of thrombosis.

THE PRESIDENT said that many years ago he saw a case of severe phlegmonous inflammation of both orbits, and had an opportunity to examine, while in bed, the fundus of each eye, and it presented the appearance which had been described by Dr. Knapp. The process was confined more particularly to the optic nerve; there was swelling of the nerve and neuro-retinitis, and subsequently optic atrophy. The patient was not absolutely, but was nearly entirely blind; it was not a sudden case, as was Dr. Knapp's, but seemed more like a case of simple neuro-retinitis, chiefly papillitis.

DR. KNAPP, replying to the remarks of the President, said that other cases which had recovered from facial erysipelas had regained sight. It was quite possible that neuro-retinitis might occur with this condition of thrombosis, such as he had described. But it had not been observed directly.

With regard to thrombosis of the orbit which follows injury to the globe, he lately operated on a patient who had lost one eye by suppuration. He was an actor, the eye staphylomatous. As it was essential for his career that there should be as little disfigurement as possible, Dr. Knapp made evisceration of the globe. After having cut off the corneal protrusion, he wiped the eye out completely without special hemorrhage, and powdered iodoform thinly over the conjunctiva. There was no suppuration whatever, but the cavity of the sclera filled with blood, the eye protruded, the patient had cerebral symptoms, and the scleral stump was pushed forward. The case presented the picture of orbital cellulitis with thrombosis, as in the man who had it from facial erysipelas. Gradually he got well, but it seemed he had been not far from the grave. Dr. Knapp would like to ask if any of the members had ever met with a similar condition.

In reply to a question by Dr. Seely, as to how much iodoform was used, Dr. Knapp said that only a very thin layer was applied, and that it did not produce any reaction; he did not think that the iodoform had anything to do with the subsequent condition.

THE PRESIDENT said he had seen a true, but moderate œdematous condition remain in the orbit for a long time after the performance of the operation; but it had not been followed by symptoms to be regarded as an aggravation of the previous condition. He had not seen the process of thrombosis and aggravated orbital inflammation following evisceration.

CHANGES IN REFRACTION RESULTING FROM A BLOW.

BY W. H. CARMALT, M.D.,

NEW HAVEN, CONN.

R. A. S., aged twenty, a student in the sophomore class of Yale College, New Haven, myopic since twelve years of age, consulted me on October 23, 1882, reporting that while practising in the gymnasium the day before, he had fallen violently forward, striking his right eye upon a bolt projecting from the floor. The blow was quite severe, sufficient to shake him up so that he kept quite still the remainder of the day and evening, neither going about nor studying, but at the time of his visit he felt quite well again, except as to his eye. Wearing his glasses habitually for all purposes of vision, near or far, he now felt an uncomfortable sensation in looking through his right glass, and could see much better at distance without it—better, indeed, than he remembered ever to have seen before without glasses; but for all that, he had a very confused sensation when looking with both eyes either with or without glasses. During the summer of 1881 his eyes had been examined in Paris—he could not remember by whom—and his present glasses were then given him, and he had seen perfectly well with either eye with them until the day before. I found them to be for the R. E., — 4.5 and L. E., — 5.5.

The time at his disposal was short on that day and my examination necessarily somewhat hasty. So far as I could determine, however, I found the refraction of his R. E. to be M. = — 1.5 (V.=0.5) ⊂ — 2. cyl. ax. 165°, V. = 0.8 —, and of his L. E., M. = — 6. V. = 0.7.

I have no note as to the actual condition of his accommoda-

tion on that day, but reading with that eye, with or without glasses, was painful to him and he declined it. I detected nothing abnormal about the movements of his iris, the pupil was round and clear and the lens gave no reflection by oblique illumination. The ophthalmoscopic examination was quite painful, but I examined the fundus by both direct and indirect methods and detected nothing abnormal, though, for the reasons already given, the observation was necessarily not exhaustive. I deferred further examination until I could get data as to his previous condition and wrote to his father, a surgeon of eminence in New York, and of very considerable ophthalmological knowledge, for the previous history of his son's refraction, and received answer, that in 1878 his eyes had been examined and recorded: R. E. = — 4.5, and L. E. = — 5.5, V. 1 in each eye; again in 1880, R. E. = — 4., L. E. = — 5.5, V. 1, and these were the only recorded observations as to his previous condition, but he knew of nothing unusual from ordinary cases of M.

Owing to a misunderstanding, I was not consulted again until February 24, 1883 (four months), when I made the R. E., without atropia, to be Asm. = — 1. cyl. ax. horiz., V. = 0.7; L. E., also without atropia, M. = — 7, V. = $\frac{10}{20}$, *with normal accommodation in each.*

I then instilled a one per cent. solution of atropia into the R. E. several times in the course of about two hours and obtained Asm. = — 0.75, cyl. ax. horiz., V. = 0.7, with total paralysis of accommodation.

On ophthalmoscopic examination at this time there was no conus at the nerve, nor other evidence of retino-choroidal trouble—not so much as I expected to find with the degree of previous M. as reported. By oblique illumination no opacity of the lens was detected.

At my request for a consultation, he called, the day following, upon Dr. Loring, of New York, who, giving a more careful examination, made the refraction of R. E., M. = — 0.75 s. ⊃ + 1.5, cyl. ax. 80°, V. = 1; L. E., M. = — 6. s. ⊃ — 0.75, cyl. ax. 45°, V. = 1, subject, however, he stated, to revision.

Subsequently, on March 4th, after the effect of the atropia

had passed entirely off and his range of accommodation was found to be normal, I found that the combination for the

$$\text{R. E. of } \left\{ \begin{matrix} +1. & \text{cyl. ax. } 90^\circ \\ -0.75 & \text{“ “ h.} \end{matrix} \right\} \text{gave V.} = 1. +;$$

L. E., M. $-$ 6.5 s. $-$ 0.5, cyl. ax. 30°, V. $= 1. -$;

and that he had an insufficiency of the int. recti muscles $= 5^\circ$. On May 30th I examined the left (the uninjured) eye under full paralysis of A. and found M. $-6.5 \bigcirc - 0.5$, cyl. ax. 25°, V. 1. —. There was, therefore, a sp. of acc. of this eye of 0.5 D. The A. of R. E. was perfect, with crossed cyl. glass could read No. 1 Sn. at 4″.

To summarize the facts of this, to my knowledge, unique case, it seems established that in a case of myopia of very considerable and nearly equal degrees in the two eyes, one was reduced by the impact of a blow to a condition of astigmatic myopia which resolved itself finally into a mixed astigmatism, without any loss of acuity of vision or range of accommodation.

In endeavoring to account for the mechanism of this change, five possibilities present themselves: First, a change in the shape of the cornea; second, a diminution or shortening of the axis of the globe; third, a displacement or dislocation of the lens backward; fourth, a pre-existing spasm of accommodation, the tonicity of which had been released by the paralytic effect of the blow; fifth, a change in the relative positions or arrangement of the lenticular fibres.

My first thought, after examining the patient the day following the receipt of the injury, was that there had been such a concussion of the lenticular fibres that the alteration in the refractive media was there, and I felt strongly that it was but the preliminary stage to the formation of a cataract. My mind was so impressed with this idea that I did not at that time advise a change in the glass of that eye, but impressed upon the patient the importance of noticing any failure in vision of that eye and to report. He did not notice anything of the kind and failed to report until four months had elapsed, when the myopia had entirely disappeared, leaving apparently the myopic astigmatism of — 1, axis horizontal.

When Dr. Loring examined him the following day, he measured the corneal image (reflection) with a keratometer and found it "the same as the other eye and normal." And I accept his statement as conclusive.

Without giving his grounds therefor he further states: "I exclude a change in the length of the ball." I had arrived at the same conclusion, from the absence of any apparent changes in the fundus in the examination made on the day after the injury, as also any trace of it in the subsequent examination on February 24th. I could not conceive so great a disturbance in the sclera and choroid, and occurring so suddenly, without some structural changes sufficient to be detected by the ophthalmoscope, and I examined very carefully by both the direct and indirect methods.

Dr. Loring examined him by the catoptric test and wrote: "I get all these images in their proper places, and what appears to the naked eye of their proper size. Still I did think the image from the anterior surface of the lens was smaller than in the other eye. This, however, may not be so," and in another place in his letter, after discussing the case with much interest, he says, "I make the cause to be a change in the position of the lens and in its curvature;" also, "Another thing which makes me think it, the trouble, is in the lens and its position is that the pupil does not dilate evenly."

On the following day, February 26th, while the pupil was still dilated with atropine, I examined his eyes for the catoptric images, without, to be sure, the aid of any measuring apparatus, but could detect neither a difference in the relative positions of these images, as compared with the other eye, nor a recognizable difference in their respective sizes. If there was a dislocation of the lens backward it might reduce, or nullify the myopia entirely, but it could only be by a rupture of the suspensory ligament of the lens either totally or in part, either of which would have shown itself also in the characteristic oscillation of the iris, in the recession of the plane of the iris, or in an interference with the accommodation; none of these were observed. As to the irregularity of the pupil referred to by Dr. Loring, while under atropia, I

did not detect it, either before or after my attention had been called to it by him. Assuming, however, that there was a dislocation backward of the lens with consequent reduction of the myopia, that would in all probability have reduced it *regularly*, not by changing a simple myopia into a compound condition of myopia and myopic astigmatism, to be followed by a mixed astigmatism. For these reasons I am unable to accept the view of a dislocation of the lens as a cause of the change in the refraction. Dr. Loring, in a subsequent verbal communication, stated that on further consideration he doubted very much if a displacement of the lens was the true explanation of the change.

Had there previously been a spasm of accommodation? Was his myopia of — 4.5 functional? He had put on glasses when about twelve years of age, because he was beginning to stoop at his lessons, and soon—I cannot state more exactly the period of time—accustomed himself to wear them for everything, reading and study, as well as for distance. There is no record of the number of the glasses he first wore, but for the last three years they have not varied from — 4.5 and — 5.5 R. and L. respectively. He has never had any pain or weariness in his eyes, the vision has never varied from time to time; there has been nothing but at first (presumably) a gradual increase of his myopia up to three years before the accident, then a steady persistence at the same degree with normal functional activity. This is certainly not what we are accustomed to see in spasm of accommodation, nor is it as we are taught in the literature of the subject. Spasm of accommodation is usually a variable quantity, and pain either in eyes or head an almost universal accompaniment. It is not, however, an absolutely constant accompaniment, and in order to eliminate this factor from the problem, so far as analogy would allow us to judge, at the suggestion of Dr. Roosa I paralyzed the ciliary muscle of the fellow-eye by a one per cent. solution of sulphate of atropia, but obtained a reduction of the myopia of not more than half of a dioptry. I cannot think that there has been a monocular spasm of accommodation all these years, convert-

ing a mixed astigmatism into a simple myopia without giving him any annoyance in the years of study preparatory to and after entering college, but which had been at last released by the blow.

The remaining alternative cannot be urged from any knowledge we have of such a condition ever having been positively determined, it is urged rather as a refuge, all the other explanations having been disproved or not being satisfactory. We know that cataract, *i.e.*, a liquefaction or fatty degeneration of the lenticular fibres is occasionally produced from a simple concussion without rupture of the suspensory ligament or capsule. There must be all grades of disturbances of the fibres, from actual solution of their continuity from violence to the simple displacement of their relations to one another which takes place in the act of accommodation. This latter is so slight and the construction of the fibres such that they become immediately restored when the pressure of the capsule is removed. Is it not *possible* that a sudden and violent impulse should have so shaken and displaced the denticulate articulations of the lens fibres that they became fastened in the position to correspond to (or cause) the error of refraction indicated above?

I acknowledge there are no observations in the literature to justify this theory, but, so far as I know, the case itself is unique, and the other possible explanations have been either disproved or are more unsatisfactory even than the one here suggested, which I make for what it is worth, hoping to bring out discussion on the part of members whose experience has been larger than my own, or who have other views.

REMARKS.

DR. KNAPP said he thought similar observations had been published, and for the greater part they were compiled in Professor Arlt's monograph on injuries of the eye (translated by C. S. Turnbull).

In these cases we find lenticular astigmatism. The ophthalmoscope shows a pear-shaped condition of the optic nerve, the side opposite to the injury gives, in the inverted

image, the large side of a pear, which is evidence that that part of the lens is the flatter. That the astigmatism does not proceed from the cornea can be made out by the reflex images. These cases may last for a long time, but certainly, if not capable of cure, are capable of improvement.

It is possible that in these cases the zonula Zinnii or the ciliary ligament ruptures or is paralyzed in a small area, as we notice frequently in the iris—irido-dialysis. In that area the elastic force of the lens is not counterbalanced by the traction from its suspensory ligament, and a greater convexity, confined to that area, is the result.

Dr. Knapp thought that a partial paralysis of the ciliary ligament, *i.e.*, one limited to a circumscribed part of its fibres, need not interfere, as had been supposed, with the mechanism of accommodation.

THE PRESIDENT said that it was difficult to account for the phenomenon upon the supposition of laceration of fibres of the ciliary ligament in the zonula of Zinn. The changes were not all produced immediately, but continued to take place for four months after the reception of the injury.

DR. KNAPP said he thought that it was possible to conceive that there was no laceration, and that paralysis might be the cause, lasting weeks or months and then disappearing.

DR. SEELY said that the special point of interest was not in the engrafting of myopia upon astigmatism, but in the diminution of the previous myopia, which was great. If he understood Dr. Knapp, the case he reported was that of production of astigmatism by injury of a myopic eye, while in the case reported by Dr. Carmalt the point of interest was the reduction of the myopia to nothing by the injury, an entirely different matter.

DR. KNAPP said he spoke only of the production of traumatic astigmatism.

DR. SEELY thought the assumption of the existence of preceding spasm of accommodation was the most reasonable explanation of Dr. Carmalt's case.

DR. CARMALT said that was a good supposition, except it must have been monocular, because he had shown no spasm in the other eye by instilling atropia.

DR. SEELY thought that fact had been previously noticed, namely, spasm absolutely relieved in one eye but not in the other at all, even after using a mydriatic for months.

DR. WEBSTER asked how it was determined that in those cases the myopia was not real.

DR. SEELY said he thought it was in one eye.

DR. CARMALT remarked that these patients came complaining of asthenopic symptoms.

DR. SEELY said certainly.

DR. BULLER asked, Why say changes in the lens?

DR. SEELY replied, because he knew of no other explanation.

THE PRESIDENT remarked that the discussion was upon Dr. Carmalt's paper.

DR. F. B. LORING asked Dr. Carmalt if there existed the peculiar blur described by Dr. Knapp.

DR. CARMALT said nothing of that kind was seen.

DR. KNAPP remarked that he did not say blur, he only said an elliptical appearance of the disk.

A CASE OF BLEPHAROPLASTY ACCORDING TO THE BRITISH METHOD.

BY E. GRUENING, M.D.,
NEW YORK.

IN planning the operation for the case here related, I could only follow one of two methods—either the Italian (Tagliacozza's), or the British (Wolfe's). I chose the latter. This method of transplanting skin without a pedicle has hitherto yielded both good and bad results, and has received praise and censure accordingly. But as positive always outweigh negative observations, I am of opinion that the cultivation of this excellent method will lead to a full knowledge of the conditions of success, and will insure for this operation its well-merited place in plastic surgery.

A young man, seventeen years of age, applied to me to be relieved of an ectropion of the right upper lid. He stated that when three years old he had sustained a severe injury of the face by the explosion of a petroleum lamp. As a result of this accident I found the integument of almost the whole forehead, of the right temple, the right cheek, and the corresponding half of the nose, changed into a dense cicatricial tissue, the upper lid everted, and its well-preserved free bor-

der attached to the supra-orbital margin. The eye, though insufficiently protected, had remained intact. The patient was very anxious to be freed from his deformity, inasmuch as he had been refused employment wherever he had offered his services. The tissues surrounding the eyes not being available for an autoplastic operation, I decided to proceed according to Wolfe's method, and admitted the patient into the eye wards of the German Hospital on October 24, 1882. Here the patient's left arm, from which I intended to take the skin required for the plastic operation, was thoroughly washed with soap and water and a two per cent. solution of carbolic acid.

On October 27th I performed the operation, the patient being under the influence of ether. As a first step, I detached the free border of the upper lid from the supraorbital margin, then undermined the neighboring tissues, exsected the deep cicatricial bands, brought the free borders of both lids in apposition, and united them by three interrupted sutures. The surface of the wound thus established measured in the vertical direction, *i.e.*, from the free border of the lid to the supraorbital margin, forty millimetres; in the horizontal direction, *i.e.*, from the inner angle of the eye to a point beyond the outer angle, fifty-five millimetres. I washed the wound thoroughly with a saturated solution of boracic acid, and, after the cessation of the hemorrhage, covered it with a pad of borated cotton previously dipped into a warm saturated solution of boracic acid. I then shaped the flap on that portion of the left upper arm, where the biceps is most prominent. The flap, as marked upon the unbroken skin, measured seventy millimetres in one direction, and fifty in the other. I prepared the flap for transportation *in situ*, that is to say, I left it in organic connection with the skin until all the subcutaneous cellular and adipose tissue had been removed. The removal of the fat was accomplished with speed and perfection in the following way: With the thumb and forefinger of my left hand I turned the flap over like the leaf of a book; an assistant then took up the lobules of fat, which I cut with scissors in my right hand.

Having thus prepared the flap, I washed the palpebral wound again with a solution of boracic acid, removed a few small coagula, and, finding that there was absolutely no hemorrhage, severed the flap completely and speedily transferred it. The flap, however, was considerably larger than the wound and overlapped it everywhere. I therefore trimmed it with scissors, giving it the exact size and form of the wound, and secured a perfect coaptation of the edges and surfaces. The parings of the flap were replaced on the wound of the arm, where, in the course of time, they became firmly adherent. The flap had no tendency to roll upon itself. It was retained in its position by a piece of gold-beater's skin upon which a layer of vaseline was spread. Pads of borated cotton were placed over both eyes and a compress bandage applied. I removed the bandage twenty-four hours later and, through the transparent gold-beater's skin, inspected the flap, which was neither displaced nor discolored. During the following twelve days I removed and reapplied the bandage once a day, always noting the same favorable appearance of the flap. On the twelfth day all the dressings were removed and the sutures uniting the lids severed. The result was entirely satisfactory, inasmuch as the flap had become firmly attached to the surfaces and edges of the wound. On that day I also tested the sensibility of the flap, and found that its peripheric portions were sensitive and the centre still anæsthetic. Two days later, *i.e.*, two weeks after the operation, the flap showed near its lower and outer edge a small circular spot of discoloration. It was the spot where, in testing the sensibility, I had pierced the skin repeatedly with a needle. The line of demarcation was soon formed and a piece of skin measuring about three millimetres in diameter sloughed away, leaving an ulcerated surface which healed in two weeks. The flap which, at the time of the operation, measured fifty-five millimetres in the horizontal and forty in the vertical direction, four weeks later had shrunk to thirty millimetres in the horizontal and fifteen in the vertical direction. This shrinkage was final, and to-day, nine months after the operation, the measurements remain unchanged. Thus the object of

the operation had been accomplished: the disfiguring ectropion being corrected and the eyeball permanently protected.

REMARKS.

DR. WADSWORTH said Dr. Gruening's paper had been of interest to him, especially as regarded the importance of keeping the flap in exact line of apposition everywhere. He agreed that the lid should be prepared first and the flap afterward, and believed this course had generally been pursued. As to freeing the flap from every particle of fatty tissue before finally severing its connection with the arm, he did not see that much was to be gained by this method. The flap is very thin, it contains no vessels, and if it is wished to preserve its vitality this can only be effected by keeping its surface in apposition with the parts beneath. So soon as it is turned back for the purpose of cleaning it, it is practically removed from the arm, even if the connection of one edge has not actually been severed. Warmth may as well be preserved by laying it on the hand of the operator. Placing the flap in warm water should be avoided. With regard to sutures he thought them usually unnecessary, and if used they should not be pushed so deeply as to cause bleeding, in which case they were of disadvantage. In the case he had reported some years ago, two sutures were employed at a part where there was a double curve of the underlying surface, and it was difficult without them to keep the flap everywhere in contact. But they were very fine, and scarcely went deeper than the horny layer of the epithelium. Sutures ought not to be relied on to prevent dragging, but simply to hold the flap in apposition till the bandage was applied. The bandage should give sufficient support.

He spoke of a case upon which he had operated with Dr. Jeffries two or three years ago, which was not a success. The patient was a young man who, a number of years before, had been treated by Dr. Jeffries a long time for lupus. There was extensive destruction of the skin on the side of the nose, and beneath and to the outer side of the eye, complete ectropion of the lower lid, and the cicatricial tissue extended so widely that it was impossible to take a flap by sliding or twisting with any chance of success. Indeed, it was doubtful in advance, if there would be found sound tissue enough to transplant upon. When the lid edge was dissected up and brought into place a considerable part of the surface of the wound was found of smooth fibrous tissue, and upon this the

flap must be placed. Although the flap worked well for a few days, it finally separated and came away entirely. In this case the skin of the arm from which the graft was taken was thicker and its contraction on removal much less than in the first case, so that it was necessary to trim the flap considerably to reduce its size.

DR. KNAPP asked Dr. Wadsworth what the ultimate result was in his case.

DR. WADSWORTH replied, in answer to Dr. Knapp, that the patient lived at a distance and he did not see him after the definitive result was reached, but there was said to have been an improvement in the appearance, despite the total loss of the graft.

DR. KNAPP thought that that was a very common result.

DR. KIPP said that in the four cases which he had reported, he operated in a manner similar to that just described by Dr. Wadsworth. In two cases he operated with perfect success, the flaps were very large and healed completely, and for two weeks remained of about the same size. After he discharged the patient the shrinking of the flaps began, and two months later they were only about one-tenth their original size. The healing, however, was perfect.

The importance of using sutures, as remarked by Dr. Gruening, was evident enough. On the other hand, that there is danger from bleeding, which cannot be arrested by making the turn according to Dr. Gruening's method, is also evident. It seemed to him that, under certain circumstances, collodion could be made to serve a useful purpose, and enable us to avoid sutures altogether.

If the parts are thoroughly dried and several little bridges are made by laying one or two fine threads across and securing them with collodion, we can get just as firm retention as with sutures, and using the collodion in such quantities, the amount of traction would be very slight indeed; besides it would be possible to use collodion that does not contract.

DR. ANDREWS had recently operated upon a case almost identical with that mentioned by Dr. Gruening. It was an aggravated case of ectropion of both lids. He applied no sutures at all, but simply applied gold-beater's skin, and over this an elastic cushion of carbolized or borated absorbent cotton, retained in place by a bandage producing only sufficient pressure to assist the plaster and keep the bared surface of the flap a gap to be filled in coaptation; in the absence of symptoms of mischief in the wound, this dressing is allowed to remain undisturbed for a week. He had been led to attach more importance to gentle compression over the flap than

to any attempt to retain it in position by means of sutures; he would ask Dr. Kipp the age of his patient.

In reply to the remarks of Dr. Andrews, Dr. Kipp said, that in the case in which there was syphilitic disease, the patient was twenty-five years of age. In the other cases the operation was performed after destruction of the lids by epitheliomata. The patients were women. Both operations failed. All the operations were of the lower lids.

DR. ANDREWS thought that the age of the patient had not been sufficiently allowed for in estimating the failures, as the skin of an old person will not heal as readily as that of a young person, other things being equal.

He had some experience in this direction in connection with skin-grafting, according to Reverdin's method, and he found that in old people the majority of grafts will fail under the same circumstances in which they would take in young subjects; but that the success was better when, in such cases, the grafts were taken from a healthy young person.

CASE ILLUSTRATING THE DIFFICULTY IN RECOGNIZING GLIOMA.

BY LUCIEN HOWE, M.D.,

BUFFALO, N. Y.

THE fact to which I would call attention is the occasional difficulty of a differential diagnosis of glioma. This can be illustrated by the brief outline of a case:

On June 13, 1881, I was consulted in regard to H. G., a male infant four months old. The attention of the parents had been called to the child's right eye about three months previously, on account of a slight redness of the globe.

The symptoms of this attack were related intelligently, and in spite of considerable cross-questioning, no evidence could be discovered which indicated more than a slight attack of conjunctivitis that had subsided without special treatment.

When the child was about two months old a yellowish reflex was noticed on the interior of that eye, and when the other was closed, it appeared from various tests that the vision of the right was, at least, much impaired.

At the time when the case came under my observation the condition presented was as follows: Cornea clear, anterior chamber very narrow, pupil moderately dilated and without any perceptible reaction, lens clear. No distinct features of the fundus could be discerned, but the interior of the globe presented that peculiar yellowish reflex which is a constant and almost characteristic appearance of glioma.

The increase of tension was hardly perceptible, but after some hesitation it was recorded in my case-book as + 1. Different tests indicated that there was no vision remaining. It is worthy of note that a grandfather on the mother's side had a well-marked epithelioma of the lip, and it was also asserted, with an appearance of truth, that a grandfather on the father's side died of a cancerous growth.

In spite of some doubt, the weight of evidence seemed to be strongly in favor of glioma, and enucleation was accordingly advised. This was done the following day. Subsequent examination showed, however, that an error had been made in the diagnosis.

There was no such growth in the globe, but as the result of a previous internal inflammation the entire vitreous had retracted into a small cone having the base resting on the lens and with the apex touching the optic nerve, its interior being filled with a semi-purulent yellowish substance composed of pus-cells, cholestrine crystals, and fat-globules.

The space between this cone and the hypertrophied retina was occupied by a fluid which escaped when the globe was opened. The slight redness of the globe which had been noticed was probably ciliary injection due to an irido-choroiditis, or a retinitis had also existed resulting in condensation of the vitreous. The reflex produced by this did not differ in any respect from that which I had seen in cases of glioma. This is not the first time that a similar error in diagnosis has been reported to this Society. In the "Transactions of 1870" Dr. Allin reports the case of a child from whom he removed both eyes for supposed glioma, and although that diagnosis was confirmed by several colleagues of wide experience, the further examination of the enucleated globes

proved that glioma did not exist. The same subject was brought up at the meeting of the Ophthalmological Society of Great Britain and Ireland last October, when Mr. Nettleship presented a paper "On Certain Cases of Destructive Ophthalmitis in Children." In this he pointed out the great difficulty of a differential diagnosis between the results of such inflammations and glioma.

It is to illustrate this difficulty that the present case is reported, realizing that quite as much is learned by failure as by success. Moreover, in view of the constant possibility of error, and also in view of the large mortality from glioma in spite of operation, it is questionable whether we are justified in such hasty recourse to enucleation as most writers are accustomed to recommend.

COMMOTIO RETINÆ; OR SOME OF THE EFFECTS OF DIRECT AND INDIRECT BLOWS TO THE EYE.

BY E. EUGENE HOLT, M.D.,
PORTLAND, ME.

DIRECT or indirect blows to the eye are of a more or less frequent occurrence, but they are rarely of that kind and character to produce what is known as "commotio retinæ," judging from the literature upon the subject. For among the numerous works upon ophthalmology there are but very few references to it, and among the abundant clinical material at Moorfields no cases are found recorded in the *Royal London Ophthalmic Hospital Reports*, the only reference to the subject being a synopsis of Dr. Berlin's paper, which appeared in the *Klinische Monatsblätter* for February and March, 1873.

The subject has been referred to but twice in the *Archives of Ophthalmology*. Articles in the London *Lancet* by Nettleship, a paper by M. Manché, read before the International Congress of Ophthalmology, and one by Seely in the *Jour-*

nal of Electrology, comprise the principal part of the literature on this subject.

This term has not been accepted by all authorities as necessary to express the condition of an eye under consideration. For while De Wecker, Warlomont, Secondi, Crispe, and Seely admit "commotio retinæ" to explain the loss of vision resulting from a blow upon or near an eye, in which an examination with the ophthalmoscope gives negative signs, others, like Nettleship, think the causes may lie beyond the parts recognized by the ophthalmoscope and which may, and not infrequently do, show themselves later in the form of atrophy.

There are still others, like Berlin and Manché, who claim that the defect of vision, in most cases, is due to irregular astigmatism in consequence of a change in the form or position of the crystalline lens.

Professor Secondi, after having examined five cases in which there was loss of vision without any ophthalmoscopic change in consequence of a blow upon the eye, concludes that "commotio retinæ" should occupy an independent place in the nosological table for the following reasons, which I translate from M. Manché's paper:[1]

1. Complete absence of lesions recognizable by the ophthalmoscope.

2. Absence of scotoma and changes in the field of vision (symptoms common in the rupture of the retina and choroid).

3. Want of all symptoms on the part of the brain and of all inflammation or consecutive atrophy on the part of the optic nerve (as there would necessarily be in case of fracture of the cranium and in hemorrhage or exudation at the origin or along the optic nerve).

4. The frequency of recoveries in such cases and the rapid action of electricity and strychnia.

Although Professor Secondi's paper appeared in the *Annales d'Oculistique* in 1871, yet Dr. Berlin's paper, two years

[1] Congres Periodique International D'ophthalmologie. Compte-rendu. Milan, 1880.

later, evidently gave the greatest impulse to a study of these rare cases, since he gave a more extended account of the ophthalmoscopic changes and clinical and pathological characters of them, together with experiments upon the lower animals.

In his experiments upon rabbits Dr. Berlin was able to produce a similar haze to that sometimes observed in these cases, and he invariably found an extravasation of blood between the ciliary body and the sclerotic when the cornea was struck, and also between the choroid and sclerotic, corresponding to the area or areas of this haze, which represented the retina in a state of simple œdema with foldings and fissures of the rod and cone layer, produced by the sub-choroidal hemorrhage.

These changes in the fundus, Mr. Nettleship[1] thinks, furnish the true explanation of the failure of sight without appealing to traumatic changes in the lens, since he observed one case in which there was the typical haze of the retina described by Berlin with amblyopia, and which was followed in three weeks by a definite patch of disease in another part of the fundus; although in the interval between the resolution of the primary retinal haze and the appearance of the patch the amblyopia persisted, during which no visible changes were observed.

Dr. Berlin, however, does not believe that the amblyopia is due to the observed changes in the retina, for the reason, first, that vision improves at the time when these changes are on the increase or at their height; second, because the improvement of sight may remain stationary for a time after the disappearance of all visible retinal changes; and third, because he has observed two cases of loss of vision in consequence of a blow, in which there was neither external nor ophthalmoscopic changes, and without the occurrence, as he supposes, of the sub-choroidal hemorrhages. Instead of assuming that the loss of vision in these cases is caused by a "commotio retinæ"—which he entirely rejects—he explains it as due to

[1] London Lancet, June 19, 1880.

irregular astigmatism in consequence of a change in form or position of the crystalline lens.

He divides the effects of these injuries into two classes: first, those in which the central vision is principally diminished, being reduced to one-third or one-eighth, and second, those in which the loss of vision is of a high degree in all parts of the field. The first he concludes to be due to extravasation of blood in the anterior segment of the globe (as such was proven to exist experimentally), causing by its pressure the extreme resistance of the sphincter iridis to the action of atropia which is invariably observed, and a change in form or position of the lens.

In the second class of cases Berlin coincides with Knapp and Geissler that they are extremely rare, and adds that the loss of sight generally becomes permanent or of long standing.

In over one hundred injuries of the eye from more or less blunt objects, occurring in a private practice of three thousand cases of diseases of the eye, I found but four that, it appears to me, can come under the head of the class of cases under consideration.

CASE I.—J. I. S., aged forty-four, was struck on the left eye by a piece of wood which he was splitting November 16, 1880. He felt faint, became nauseated but did not vomit. On recovering he found he could not see with the left eye.

When seen, forty hours had elapsed since the accident. There was some episcleral injection, and the eye was irritable. The pupil responded very imperfectly to light and appeared to be somewhat pushed forward; otherwise nothing abnormal was observed. The tension was quite normal as compared with that of the fellow-eye, and there was tenderness to the touch in testing for it.

With the ophthalmoscope nothing abnormal in the media or fundus could be made out which was thought to be connected with the injury. Vision was reduced to counting fingers at 1 m. The field of vision was but slightly contracted. The pupil dilated slowly, and not to the full extent after repeated applications of atropia. Leeches were applied to the temple, a dose of the mild chloride ordered, and

a bandage applied. On the next day, the third from the accident, the pupil had dilated a little more under the further use of atropia, the eye felt better, and he could count fingers at 3 m. On the twenty-fifth day after the accident he had entirely recovered, and expressed himself that the sight was as "clear as a bell."

Leeches were discontinued after the third application, and the atropia after the subsidence of the congestion, when a mild continued current of electricity was used with apparently good effect. The sight gradually returned, during which time there were no ophthalmoscopic changes. Glasses were prescribed to neutralize his myopia, and he returned three months after to say that the glasses had given him great comfort. There were no changes observed in the fundus at this time.

CASE II.—E. W. L., aged twenty-eight, came to my office February 28, 1881, stating that about two hours previous to this time, while in the act of stooping down suddenly, he at the same time hit his foot against a cane, knocking it over so that the large round head of it came in contact with the right eye while it was open, giving it a severe blow and causing nearly total loss of sight. He felt faint and nauseated, but did not vomit.

There was some swelling of the lids and slight extravasation of blood beneath the conjunctiva, with a little loss of corneal epithelium. There was marked tenderness in testing for the tension, which was quite like that of the fellow-eye. The pupil responded slowly and imperfectly to light, and dilated in an oval form after the application of atropia.

With the ophthalmoscope, both before and after the use of atropia, nothing abnormal was observed.

R. E., V. $\frac{6}{60}$; Jaeger 20 at 40 ctm., slowly.

L. E., V. $\frac{6}{6}$ +; accommodation normal.

A leech was applied to the temple; he was ordered to shower the eye with a one per cent. solution of chloride of sodium quite warm, and continue the atropia prepared in castor-oil as suggested by Dr. Green.[1]

[1] Transactions of American Ophthalmological Society, Vol. II., p. 355.

March 1st.—Second day. "Eye feels clearer, and the full feeling" and tenderness of the eyeball has nearly disappeared. V. $\frac{6}{12}$; Jaeger 14 at 30 ctm. Repeated leech and continued atropia.

March 4th.—Fifth day. R. E., V. $\frac{6}{6}$; Jaeger 1 at 15 ctm.

He was examined ophthalmoscopically twice daily for two days, then once a day, and two months after the accident, but the eye always compared favorably with its fellow, which was normal.

CASE III.—C. A. S., aged eighteen, consulted me on the evening of October 26, 1881, stating that he was a freshman in Bowdoin College, and that on the evening preceding this, upon hearing the order "out lights," he passed into his sleeping-room, in which there was no light, and upon placing his face to the glass and looking out, a large lump of coal[1] came through it and struck him over the left eye. He was not quite knocked over by the blow, nor did he completely lose consciousness, but he felt nauseated and in the course of twenty minutes vomited.

He retired, but was restless and got but little sleep on account of the pain in and above the eye. In the morning he found he could not see with this eye and consulted Professor Mitchell, who advised him to return home. The pain in and above the eyeball had continued all day and had grown worse at 7 o'clock, when I saw him.

Examination showed bruises on the forehead, cheek, and nose where the missile had struck, but there was no appearance of injury of the anterior structures of the eye or its appendages. The pupil responded to light slowly and imperfectly. The eye was extremely sensitive and tender to the touch on testing tension, which was thought to be slightly increased. With the ophthalmoscope, both before and after the application of atropia, the refracting media were found to be perfectly clear.

The only change noted in the fundus was a slight increase of the size and tortuosity of the veins as compared with the

[1] The weight of which was about a pound avoirdupois.

fellow-eye. The eye was myopic 1.5 D. Vision was reduced to perception of light in all parts of the field. Ordered two leeches to temple, a laxative of mild chloride and potassium bromide with very little morphia.

October 27th.—Second day. Leeches made his head feel clearer: he soon felt hungry and ate some food. Rested fairly well. Some pain in and above the eye. Slight increase of tension and marked tenderness in testing for it. No improvement of vision.

Dr. Gordon was selected as a consultant, and he confirmed the condition as here described. Ordered two more leeches to the temple, bromide potassium with morphia, if needed, and two compound cathartic pills.

October 28th.—Third day. Leeches gave relief to dull pain in and above the eye. Slept well with one dose of soporific. Free motion of bowels. Tension like that of the fellow-eye and tenderness in testing for it much diminished. First indications of return of vision, since he can count fingers at 30 ctm. Ordered two more leeches to the temple, hot-water douche, and two and a half milligrams of red iodide in elixir calisaya twice daily.

October 29th.—Fourth day. No pain or uncomfortable feeling about the eye. Counts fingers at one metre. Leeches discontinued.

November 1st.—Seventh day. Vision has steadily gained, and without a glass is $\frac{6}{30}$; c. — 1.25 D. sph. = $\frac{6}{12}$; Jaeger 14 at 35 ctm. Had a marked languid and inactive appearance, and said he felt weak and found it a great effort to do anything. Applied a mild continued current of electricity.

November 6th.—Twelfth day. Vision $\frac{6}{21}$; c. — 1.25 D. sph. = $\frac{6}{9}$, Jaeger 4 at 35 ctm.

Ordered twenty centigrams of iodide of potassium with the red iodide to be taken in a vehicle of compound tincture of cinchona and compound syrup of sarsaparilla.

November 8th.—Fourteenth day. R. E., V. $\frac{6}{30}$; c. — 3 D. sph. ($\frac{6}{12}$ +) $\supset$ — 0.25 D. c. 180° = $\frac{6}{9}$. L. E., V. $\frac{6}{21}$; c. — 1.5 D. = $\frac{6}{9}$ —. L. E., Jaeger 1 at 25 ctm.

Had glasses prescribed by an oculist three years ago who

used atropia in fitting them; they are as follows: R. E. — 1 D. sph. ⌒ — 0.75 D. c. 180°. L. E. — 0.75 D. c. 180°.

November 15th.—Twenty-first day. Distant vision same as test on 8th inst. Reads Jaeger 1 with left eye from 10 to 50 ctm. As he complained of not seeing at a distance as well as formerly, concave spherical were prescribed, and he was advised to begin to use his eyes systematically three minutes twice daily, and increase this time one minute each day.

November 25th.—Thirty-first day. On the 22d inst. he read twenty minutes, and had pain in the eyes at the last sitting, therefore he had omitted the reading. There was some uncomfortable feeling in and above the eye, and tenderness on slight pressure. Medicine and application of mild continued current of electricity discontinued.

November 27th.—Thirty-third day. There was some dull pain in and above the eyeball, similar to, but less severe than that first felt, and there was marked tenderness on slight pressure. The distant vision had diminished. He could make out Jaeger 1 at 30 ctm., but the letters were unsteady and he felt uncertain in reading them.

Without going into details, this was the beginning of a relapse in which the vision became profoundly affected, but was not reduced below $\frac{4}{60}$. Under a similar treatment to that pursued at first, he regained his vision and accommodation, but the process was very much slower than his first recovery.

On December 23d, the fifty-ninth day of the accident, and twenty-eighth day of the relapse, he visited Drs. Agnew and Webster of New York. Dr. Agnew wrote as follows:

"I have examined with much care the case of Mr. C. A. Strout, which you kindly wrote to me about. It seems to belong to that curious class of cases called 'commotio retinæ.' I think that your line of treatment has been very judicious. I see no occasion to divert your aim. I think that any expert called upon to make an ophthalmoscopic examination without any information given as to the previous history would fail to find any considerable lesion. There may be the slightest want of color in the disk, and it is very possible

that, following the injury or concussion, there was a very slight reaction or neuritis. I would say that a year of comparative rest, or very moderate use of the organ at near work, would be wise, treating the eyes on the plan which we follow in treating the nervous system after concussion of the brain."

The ophthalmoscope was repeatedly used, and the only change observed was a slight fulness of the veins at first, and on the third day of the accident, and during the relapse there was a doubtful retinal haze. The persistence of loss of vision to perception of light for four days, the absence of external and ophthalmoscopic changes, the relapse and final recovery, together with the peculiar manner in which the accident occurred, makes this a most remarkable case clinically and from a medico-legal point of view, since Mr. Strout's father, being an eminent lawyer, made it a test case to ascertain whether the acts done by those who indulge in "hazing" come under the law.

At the trial I took the position that as this was an unusual accident, in the nature of a concussion, and as there had been one relapse, no one was justified in making predictions as to the future usefulness of the eye, to which the attorney for the defendants objected, and thought that the case called for my "judgment as to probabilities rather than possibilities."

The condition of the eye, July 6, 1883, over twenty months after the accident was as follows: L. E., V. $\frac{6}{15}$; c. — 1.25 D. = $\frac{6}{6}$ —. Field normal. Color perception normal. Field for blue, red, and green similar to that of the fellow-eye, which corresponds nearly to the average normal as given by the very latest authorities[1] on this subject.

CASE IV.—G. H. H., aged thirty-thee years, came early in the morning of May 21, 1883, stating that about two hours previous to this time, while splitting wood, a stick, a foot long and three inches thick, struck his right eye with such force as to nearly knock him over, causing him to feel faint and nauseated. There were spasms of the lids and pain in the eye,

[1] Diseases of the Eye: H. D. Noyes, M. D. Traité Complet d'Ophthalmologie par L. de Wecker et E. Landolt. Tome Premier.

slight loss of corneal epithelium, and a very imperfectly acting pupil. Ophthalmoscopic examination negative. Direct vision counts fingers at 1 m. Field but slightly affected. After several applications of atropia the pupil dilated fairly well, oval in form, the long diameter being directed downward and outward.

May 22d.—Second day. Restless last night. Pupil circular. R. E., V. $\frac{6}{60}$; c. + 1.5 D ($\frac{6}{15}$) $\supset$ + 0.5 D. c. 90° = $\frac{6}{12}$. When looking at a letter another appears to overlap it, and both are seen through a mist.

May 23d.—Third day. Sees top of letters better than the lower part: they still appear double and through a mist. R. E., V. $\frac{6}{24}$; c. + 0.75 D. = $\frac{6}{12}$; cylindrical glass not accepted. Throwing head back without a glass before the eye vision is $\frac{6}{60}$; inclining it forward, $\frac{6}{12}$. Atropia discontinued.

May 24th.—Fourth day. R. E., V. $\frac{6}{9}$; c. + 0.5 D = $\frac{6}{9}$. The double vision and mist persist to a slight extent. Inclining head forward makes vision clearer; backward mixes letters up, and he can read only $\frac{6}{30}$.

May 25th.—Fifth day. R. E., V. $\frac{6}{9}$; c. + 0.5 D. sph. = $\frac{6}{6}$. There is still a slight overlapping of letters and a little mist before the eye. Throwing head forward reads $\frac{6}{6}$, backward $\frac{6}{24}$, and the letters appear all mixed up.

May 26th.—Sixth day. R. E., V. $\frac{6}{6}$; Hm. 0.5 D. No overlapping of letters and no mist. Throwing head backward does not mix up letters.

May 28th.—Eighth day. R. E., V. $\frac{6}{6}$ +; no Hm. Accommodation normal. Eye feels perfectly well.

July 8th.—Forty-eight days after the accident. Ophthalmoscopic examination negative. R. E., V. $\frac{6}{6}$ +; no Hm. Accommodation normal. Field for white, blue, or red like the fellow-eye, which is normal; that for green in each eye much larger than given by the authorities referred to; color perception normal.

In reviewing these cases it will be noticed that several things are common to them all. There was the effect of the blow producing almost unconsciousness, followed by faintness, nausea, and in the severest case (No. 3) by vomiting; sudden

oss of sight from $\frac{6}{60}$ to perception of light; slight external appearances of injury from the blow in three cases; more or less imperfectly acting pupil in all, and resistance of sphincter iridis to the action of atropia. There was marked tenderness and sensitiveness of the eye manifested in testing for tension in all the cases, and this seemed to diminish *pari passu* with the return of vision. The tension was normal except in No. 3, where it was thought to be slightly increased. Ophthalmoscopic examination was negative except in No. 3, in which the veins appeared a little larger and more tortuous than in the fellow eye, and there was a doubtful retinal haze. Recovery was uninterrupted except in No. 3, in which there was a relapse. In discussing what actually happened to the eye, the force and direction of the blow may assist us somewhat.

In Nos. 1 and 4 the blow was from the rebound of a stick of wood, and the eyeball itself was undoubtedly struck more or less directly. In No. 2 the eyeball was struck directly by the round head of a cane.

In his experiments upon rabbits Dr. Berlin found that the blow directly affected the parts struck and a point in the fundus of the eye opposite, and he inferred that the eyeball was driven against the wall of the orbit and was affected as if by a direct blow, to which supposition Arlt[1] objects on account of the equable distribution of the elastic cushion in which the eye rests, although he does not deny this uniform effect of a direct blow. This part of the subject is too extensive to be further considered here. The loss of vision in Nos. 1 and 2 may be explained by a hemorrhage in the anterior segment of the eye causing change in form or position of the lens and hence irregular astigmatism. There may also have been a sub-choroidal hemorrhage, and finally a concussion of the retina. If it is admitted that each of these causes may produce the effect observed, who shall say, in the absence of positive proof, which one or, if all did not take part in it?

In Case 4 it seems quite evident that there was a change in

[1] Injuries of the Eye and their Medico-Legal Aspect. Translated by C. S. Turnbull.

form or position, or both, of the crystalline lens, and that the disturbance in vision was largely, if not entirely, due to this.

In the third case the blow was indirect, that is, the eyeball was not directly struck. The force was great, for it was stated in court that the tree, beneath which the person whom Mr. Strout saw throw the coal, was thirty-six feet from the building, and that the square of glass through which it came was fifteen feet from the ground. The hypothenuse of the triangle would be thirty-nine feet, a distance that would give to the missile the maximum velocity as ordinarily thrown by a person, thus accounting for the clear-cut hole in the glass and the absence of scattering pieces, since the glass seemed to have been taken out as a whole and applied over the eye in front of the coal.

In this case the most sanguine advocates of irregular astigmatism cannot, from this cause alone, account for the loss of vision to perception of light for four days. Nor can it be explained by the slight increase of tension, for that had disappeared before the return of vision. The absence of consecutive atrophy, and limitations of the field of vision, together with the return of sight, would militate against any lesion of the choroid, retina, and optic nerve; therefore, in this case at least, we are forced by exclusion to admit a "commotio retinæ" as the cause of the loss of vision.

REMARKS.

THE PRESIDENT remarked that Dr. Holt had reported four cases manifestly dissimilar in character. In one of these cases the injury was sustained upon the forehead. He begged to remark that that belonged to the class of cases which had been thoroughly studied by Berlin in Graefe and Saemisch's Handbook, and had been explained upon the supposition that a fissure had been made, running through the optic foramen of the orbit, and this view was corroborated by autopsies; and unless thus explained, the phenomenon called commotio retinæ is a mythical supposition. With regard to opacity of the retina from direct impact of the eyeball, he had opportunity to confirm that statement by seeing a patient who had been struck upon the eye by a blunt instrument. Inflammatory process was set up within a short period, and when he

saw the eye the distinct white patch which has been alluded to could be seen, and it remained for twenty-four hours and then disappeared.

DR. SEELY thought the subject could not be dismissed so summarily as the President had intimated. He supposed that most of us were familiar with the statement with regard to fracture running through the bone. He did not remember the details of the cases which he had published, but he recollected sufficient to enable him to say that they could not be explained by any such supposition, because a single application of electricity restored a vast amount of vision. In one case in particular, there was no explanation for the extreme lowering of vision of which the patient complained, who was struck in the eye with a piece of kindling wood. A single application of the constant current restored vision to such an amount as certainly to place the case outside of the class of which the President had spoken as being explainable by fracture. Dr. Seely thought he could not accept in Dr. Holt's third case, the explanation which had been given, although the case was not so brilliant in restoration of vision as the case which he had reported, and which he would not have attributed to commotio retinæ. He did not wish to be regarded as a defender of "commotio retinæ" especially, but he contended that there was something there which was not quite right, and which could not be so easily disposed of as we would be led to think by the experiments alluded to.

DR. HOLT asked if there was not some manifest disturbance in the field of vision in the cases of fracture.

THE PRESIDENT said that loss of sight in these cases is variable. It may be total or partial. As he listened to the other cases reported by Dr. Holt, he observed that mention was made of slight dilatation of the veins, and it seemed to be without doubt that it must fall under the class of cases of injury of the bone with consecutive interference with the optic nerve, probably in the optic canal and not of the ball, and that we should not look into the eyeball for the seat of the injury, but that the disturbance was due to traumatic influence upon the function of the optic nerve.

DR. WEBSTER asked how to explain the relapse which occurred?

THE PRESIDENT said that the man had symptoms of meningeal inflammation at first, and why not subsequent inflammation at the same point?

DR. GRUENING had had occasion to see one case of commotio retinæ, a few hours after the receipt of the injury. A

man who had been struck on the forehead came with emphysema of the lids. He was unable to open his eye, and when Dr. Gruening opened it the patient said he was unable to see; and on further examination the doctor found there was absolute blindness. On examination of the fundus the doctor found haziness of the retina as described, and the cherry-red spot which we see in embolism. The patient returned in twenty-four hours, the haziness was gone, the cherry-red spot had disappeared, and vision had returned. Certainly it was a case of commotio retinæ.

THE PRESIDENT said (in answer to remarks of Dr. Gruening) that Dr. Gruening's case meant injury direct.

DR. KNAPP said, with reference to the white opacity of the retina, that he was uncertain whether it was due to shaking of the retinal elements, or whether it in some way depended upon deprivation of nutrition, since the opacity is the same as for embolism; but the essential feature is that impairment of sight is only trifling, and disappears in two or three days altogether.

DR. SEELY said furthermore, about the uncertainty in such cases and the difficulty of explanation, that when some one would give a full explanation of unconsciousness after injury of the head, we would be better able perhaps to explain what may take place when an injury of a nerve of special sense has been sustained. He did not think we had had any explanation as yet for the phenomenon of unconsciousness.

DR. WADSWORTH introduced a case which illustrated how a comparatively small amount of violence may give rise to visible, but temporary, changes in the retina. A boy was brought to him two hours after having been struck on the eye by the recoil of a stretched rubber thread. There had been some pain for a short time. A small clot occupied the lower part of the anterior chamber. Vision was very nearly normal. The inner two-thirds of the disk was slightly reddened; there were yellowish-white, broken lines along some of the vessels going to the nasal portion of the retina, and for some distance to the nasal side of the disk the retina showed a lack of transparency, while on it were scattered whitish patches, with soft edges, resembling in color the œdema seen with embolism. Twenty-four hours later the patches and lines along the vessels had disappeared, but the loss of transparency on the nasal side and the reddening of the disk persisted several days longer.

THE PRESIDENT (in answer to remarks of Dr. Wadsworth), said, concerning Dr. Seely's case, which made such a vast

improvement under a single application of electricity, that it called to mind a patient whom he saw, a boy who was attending school in the vicinity of Boston, when he was hit in the eye with a snow-ball. He was immediately taken to a physician, who examined the eye and told him that it was seriously impaired, and that there was inflammation of the retina. The boy two days afterward came to New York, when Dr. Noyes examined him with the ophthalmoscope. At that time the patient declared that he was absolutely unable to see. Dr. Noyes examined him carefully, and determined that there was no disturbance of his visual power, and that he could see perfectly well. The boy was obstinate in his statement that he was unable to see, and to convince him that he had vision the opposite eye was bandaged and he was sent home. On the next day he returned, saying he could see. In the injured eye there was a large quantity of opaque optic nerve fibres.

DR. SEELY said that this was a good case; but the explanation did not apply to his case.

DR. MCKAY referred to a case which he saw eight or ten years ago, in which a man proposed to bring a suit for damages on account of injury to his eye. He examined the patient several times, and detected that he had binocular vision, and told him that his injured eye was not blind, and that he would swear that he could see with it. The man then admitted he did see, and did not bring the suit.

DR. WADSWORTH referred to a case, which was cured a good deal easier than any that had been related. A boy thought that he had got something into his eye, and kept his eye shut. There was no desire or design to deceive either himself or the physician; but he declared that he was unable to open the eye. Dr. Wadsworth gently examined the eye, and gradually coaxed the patient to allow him to raise the lid, and he soon was able to hold the lid open completely, and the patient soon afterward went home with both eyes open.

DR. SEELY said there was one point in making the differential diagnosis in his case which had not been alluded to as being present in any of the cases which the gentlemen had reported: at each visit which his patient made he held before her the fact that she was paying a fee.

TWO CASES OF OPHTHALMOPLEGIA EXTERNA, ASSOCIATED WITH DISEASE OF THE OPTIC NERVES, FROM BRAIN-TUMOR, WITH AN ACCOUNT OF THE POST-MORTEM EXAMINATION.

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THE two cases of ophthalmoplegia externa, associated with disease of the optic nerves, which are here reported somewhat in detail, were due to brain-tumor; and they are of interest, partly because of the opportunity they gave for studying the several symptoms as they were developed, and partly because of the autopsy which was obtained in each case.

In central paralyses of associated ocular movements it is not always easy to distinguish between cases where the lesion is at the basal centres of motion; and cases in which the lesion is situated in the cortex. In those cases of paralysis of several ocular muscles in which the power of motility of the several muscles is gradually lost, or in which both eyes have become almost fixed and immovable, the lesion is probably always basal. The symptoms here are usually more advanced in one eye than in the other, and sometimes, as in the first case here reported, the motor paralysis is associated with a progressive double optic neuritis, because of the close relation which exists between the nuclei of origin of the motor and optic nerves at the base of the brain. In the first case reported there was no ptosis of either upper lid, and this fact may be of interest in connection with Ferrier's idea of the possible existence of a separate centre for the elevation of the upper lid toward the upper part of the anterior lobe of the cerebrum. Most observers have noticed that in

well-marked cases of ophthalmoplegia externa, the levator of the upper lid is much less affected than the other muscles, and the paralysis of this muscle usually recovers first. Nettleship thinks that in central paralysis this might be accounted for by the movements of the upper lid being more automatic than those of the eyeball; but admits that this explanation would hardly apply in cases of disease of the nerve-trunk. (See *British Medical Journal*, December 2, 1882.) In both the cases here reported the iris and ciliary muscle were affected, the latter slightly, as well as the extrinsic muscles, while the levator of the upper lid was involved only in the second case. In the first case the lids were retracted somewhat as in Basedow's disease. In these cases of central origin, when the optic nerve is affected, the lesion is usually a papillitis or neuro-retinitis rather than a progressive atrophy. But in the second case the lesion would probably have been a simple descending atrophy, if the patient had lived long enough, rather than a neuro-retinitis.

CASE I.—J. L., aged thirty-four, was first seen by me on February 14, 1881. This patient was a civil engineer by profession, and had never suffered from any serious disease, except a severe and obstinate attack of malarial fever some five years before. For about fourteen months he had suffered from occasional attacks of severe headache, which at times was limited to the vertex, and at other times was confined to the occipital region. These headaches gradually increased in frequency and severity, and for the past two months had been nearly constant. For the past three months he had suffered from diplopia, which at first did not trouble him very much; but after a time it changed in character and became very confusing. When either eye was closed he at first could see perfectly well with the other, but about three weeks before he presented himself for treatment he noticed that the vision of the left eye was quite defective, and he thought that that of the right eye had very recently also failed. Since the headaches began they had occasionally been accompanied by nausea, but of late the nausea accompanied every attack of pain in the head, and oftentimes there was actual vomiting.

The patient also complained of vertigo, which was always brought on by any sudden movement and occasionally appeared at other times. With the exception of the headaches and diplopia and the gastric disturbance, the patient's health was good and his appetite remained excellent till near the last. The urine had been repeatedly examined and nothing abnormal found. When I first saw him the most marked objective symptom was the staring appearance of the eyes. There was a moderate amount of exophthalmus in a direction forward, with almost complete immobility of the left eye and limitation of motility inward of the right eye. Both pupils were equally dilated and very sluggish. The upper lids appeared retracted and drawn upwards. In the right eye, V. = $\frac{20}{15}$, and he could read Sn. D = 0.8 from eight to ten inches; in the left eye V. = $\frac{20}{200}$ eccentrically and unimproved by any glass. There was a large irregular central scotoma in the field of the left eye, and a slight indistinctness of central vision in the right eye, though no scotoma could be mapped out. The color scotoma in the left eye was co-extensive with the visual scotoma except on the nasal side of the field, where it extended somewhat farther. The media were clear in both eyes. In the left eye there was an extremely well-marked papillitis, which extended some distance beyond the margin of the disk, and was accompanied by an extensive yellowish-white exudation in the region of the macula, and by numerous punctate and striated hemorrhages. In the right eye there were the signs of papillitis in the first stage, but there were no hemorrhages and no visible exudation near the macula, or between the latter and the disk. The urine was carefully examined, but neither albumen nor casts were found. Its specific gravity was 1.023, reaction faintly acid, and there was a small amount of sugar.

An examination of the muscles of the eyes showed on the left side a complete paralysis of the internal and superior recti muscles, partial paralysis of the inferior rectus, and an apparent defect in the action of the superior oblique muscle. On the right side there was complete paralysis of the internal rectus only, the other muscles being intact. Two days later,

on February 16, 1881, vision had sunk in the left eye to $\frac{8}{200}$, and in the right eye to $\frac{20}{100}$, and here the papillitis had become nearly as marked as in the other eye. On February 19th and 20th he vomited all the food taken, and complained of severe frontal headache, and the heart's action was increased. Toward evening of the latter day the vomiting ceased, but he lost all power of recalling what had occurred during the day. At half-past nine of that evening he rose from bed and went to the water-closet and had a natural evacuation of the bowels, and on his way back to bed he drank a glass of water. At half-past ten o'clock, one hour later, he suddenly became comatose, with very slow and shallow respiration, and very rapid action of the heart. Death ensued in about five minutes after the attack began. At no time was there any increased temperature, nor any interference with either general motion or sensation.

Autopsy, thirty-six hours after death.—The ordinary signs of cadaveric rigidity were well marked. The vessels of the scalp were found exceptionally bloodless. On the removal of the calvarium there were no signs of any inflammation of the endosteum or meninges, nor any special hyperæmia of the latter. The Pacchionian bodies were well marked. On opening the arachnoid cavity there was seen to be a large amount of cerebro-spinal fluid. Both lateral ventricles were enormously distended, particularly the one on the right side, which contained nearly four ounces of fluid. The fourth ventricle was distended and its floor softened throughout nearly the whole extent. In the right third ventricle was a cystoid mass, as large as a large walnut, which was attached to and developed in the anterior end of the choroid plexus. The optic chiasm was compressed and both optic tracts were flattened to ribbon-like bands across the crura cerebri. There was a spot of softening, about as large as a silver quarter-dollar, at the anterior end of the inferior convolution of the right middle cerebral lobe. Careful dissection was made of the chiasm and optic nerves as far forward as the eyeballs, the roofs of the orbits and portions of the wings of the sphenoid bone being removed for the purpose with bone-forceps. No dis-

tention of the sheath of the nerves was found until close to their entrance into the sclera, where there was a slight distention. This was more marked in the left eye than in the right eye, where it did not extend all round the circumference of the nerve. The posterior portions of the eyes, with the optic nerves, chiasm, and tracts as far as the cerebral peduncles, were removed for microscopical examination. The thoracic organs were found tolerably healthy, with the exception of some bands of adhesions between the costal and pulmonary pleura on the right side, the remains of an old pleurisy. The liver was slightly enlarged and fatty; the spleen was enlarged, with signs of old infarctions. The kidneys were normal in size, and the cortex showed only slight signs of disease. The other organs were not examined. Microscopical examination of both transverse and longitudinal sections of the optic tracts, commissure, and extra-orbital parts of the optic nerves showed the ordinary signs of atrophy from pressure in both the neuroglia and nerve-tissue itself. As the intra-orbital portions of the optic nerves were reached, however, very evident signs of interstitial neuritis were met with, and these increased as the region of the eyeballs was approached. There was an enormous development of nuclei, some round, others elongated, and a very marked hypertrophy of the connective-tissue fibres of the neuroglia, the latter being more numerous in the posterior part of the intra-orbital division of the optic nerve, while the cell-proliferation was more marked near the scleral termination of the nerve. The optic disk was seen to be very much swollen and the cellular proliferation was excessive here and extended for a considerable distance into the retina, especially on the temporal side, where the exudation around the macula seemed to be of the same nature, with the addition of numerous collections of blood-globules.

CASE II.—J. T., aged thirty-three, was first seen by me early in October, 1882. This patient had had a sore upon the penis thirteen years before, which was probably a chancre, as it was followed by a general cutaneous eruption, ulcers in the throat, which have left their traces on the fauces, rheumatic pains in the limbs, and by one attack of inflammation in the

right eye. For the past four years there had been no symptoms of the constitutional disease. He had never had any malarial disease, and for more than three years he had not missed a day at his work, which was that of a builder. He used tobacco to excess, but had never used any alcoholic stimulants. About four months before he applied for treatment he began to suffer from headaches, which were always frontal or through the temples. These headaches were at first intermittent, and never lasted more than a few hours, but they gradually increased in frequency, severity, and duration, until for more than a month they had been constant, and were at times so severe as to almost craze him. During this last period he began to see double, the diplopia at first being confined to the left side of the binocular field of vision, but it soon invaded the entire field. His gait became very uncertain, especially when he rose from a chair or turned round suddenly, the feeling being that he would fall over to one side or the other. That this was not due to the diplopia alone was proved by bandaging one eye and then causing the patient to rise suddenly, walk rapidly, or turn round suddenly; the staggering and sensation of falling occurred as before, though the patient thought that they were not so marked. The patient had a blanched, unhealthy look, which, however, was different from the waxy look of chronic renal disease. There was a double systolic cardiac murmur and an intermittent pulse. The urine on examination showed albumen, but no sugar and no casts. In the right eye V. $= \frac{20}{30}$ and in the left eye V. $= \frac{20}{30} +$, and he read Sn. D. $= 1.25$ at twelve inches. The accommodation was somewhat limited. The field of vision of the right eye was slightly limited on the nasal side, but there was no scotoma in the field of either eye, and no apparent interference with the color sense. There was complete paralysis of both third and sixth nerves, and the eyeballs stood slightly divergent and immovable. There was ptosis of the upper lid of both eyes, slight exophthalmus, and moderately dilated and immovable pupils. The media were clear and there was nothing pathological in the

fundus of either eye, except a slight indistinctness and œdematous condition of the temporal margin of the optic disk and adjoining portions of the retina in the right eye.

On the supposition that the cause was syphilitic and possibly located in the kidneys as well as in the brain, potass. iodid. was administered in increasing doses, beginning with fifteen grains three times a day, and he was also given cod-liver oil, quinine, and iron, on account of the condition of the kidneys. The administration of the potass. iodid. was interrupted every few days, and an interval allowed to elapse before recommencing its administration. Under this treatment the patient's general condition improved, the albumen nearly disappeared from the urine, there being left merely a trace, and the staggering in the gait became less marked. There was, however, no improvement in the diplopia and no lessening in the severity of the headache, which it was found necessary to relieve by anodynes. On October 23d the patient had a series of epileptiform convulsions, which recurred so frequently that chloroform had to be administered. From this time on the patient slowly grew worse, though there was no recurrence of the convulsions. The headaches continued with the same severity and the staggering gait and vertigo returned, so that the patient kept his bed. On the evening of November 5th he had a convulsion, which soon passed into coma, and this gradually deepened until the following morning, when death occurred. Ophthalmoscopic examinations were made daily up to the day of death, but no further changes were noticed in the fundus of either eye, though vision had steadily failed during the last three weeks of life. The last record was on October 28th, when it was reduced to $\frac{10}{200}$ in the right eye, and $\frac{20}{200}$ in the left eye.

Autopsy, thirty hours after death.—Cadaveric rigidity well marked. Nothing abnormal was noticed in the scalp or calvarium on removal. The dura mater was firmly adherent at two or three points to the calvarium, and the blood-vessels were somewhat engorged. Considerable fluid was found in both lateral ventricles and a little in the fourth ventricle.

There was some softening of the cerebral substance discovered on incising the right middle cerebral lobe, and about midway in the substance of this lobe, and extending forward into the posterior part of the right anterior lobe near the median line, was a dense tumor about the size of a small pigeon's egg, and surrounded by a thin vascular membrane or covering. This tumor was apparently developed within the brain substance of the middle lobe, though it was somewhat nearer the base than the convexity. It was surrounded by a layer of softened brain-tissue of varying thickness. The right lateral ventricle and the portion of the right middle cerebral lobe on the median side of the tumor was pushed over beyond the median line to the left side, and the topographical anatomy of this region was considerably distorted. The optic tracts were slightly flattened, and the third and sixth nerves of the right side were pressed upon and flattened by the pressure of the tumor in the lobes, and this undoubtedly affected indirectly the corresponding nerves on the left side. There was no distention of the sheath of the optic nerves and no flattening of the chiasm. Both optic tracts were the seat of moderate interstitial neuritis, but this microscopic change was but very slightly marked in the optic nerves, and could be traced but a short distance in front of or below the chiasm. The heart was somewhat hypertrophied and was the seat of pronounced valvular disease. Hypostatic congestion of the lungs was well marked, but no other microscopic change was noticeable. The liver was large and fatty. The spleen was apparently normal. The kidneys were somewhat contracted and the cortex decidedly diseased.

The tumor, on microscopical examination, proved to be mainly composed of a very large number of small, round, granular, nucleated cells, closely imbedded in a matrix of very fine connective-tissue fibres, and contained but very few blood-vessels. It presented in places very much the appearance of a syphilitic gumma, while in others the impression conveyed of the growth was that it was a small-cell sarcoma. In view, however, of the syphilitic history of the patient, the

probabilities were regarded as in favor of its being a gummy tumor.

This case, as usual in ophthalmoplegia externa from nuclear disease, showed bilateral symptoms. The levators of the upper lids were less affected than the ocular muscles. The fifth cranial nerve was not affected.

B.P.L. Bindery,
MAR 31 1886

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